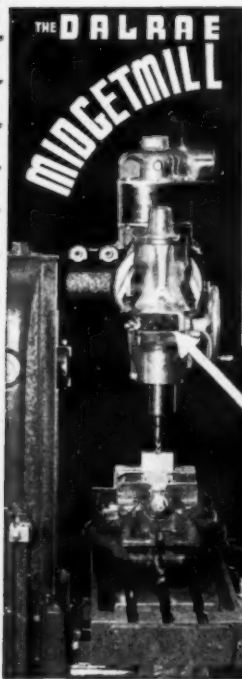


HITCHCOCK'S *Machine Tool* **BLUE BOOK**

FOUNDED

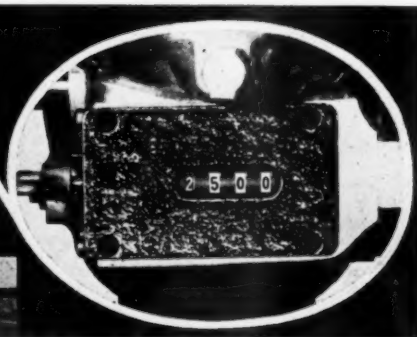
NOVEMBER 1939

1905



**NOW YOU CAN
SET CUTTING TOOLS
BY DIRECT READING**

**For end mills requiring spindle
speeds from 300 to 4000 R. P. M.**



**NO
DIALS**

**NO
GRADUATIONS**

**NO
DIAL INDICATORS**

The DALRAE MIDGETMILL is a QUILL FEED, HIGH SPEED MILLING MACHINE ATTACHMENT which MILLS, DRILLS AND BORES. Its entirely new method of setting cutting tools by **DIRECT READING** is faster, easier and extremely accurate. Guaranteed maximum error on $2\frac{1}{2}$ stroke is $\pm .00025$ — $.00025$.

Write now for complete facts on the MIDGETMILL.

MARVEL

You are paying too much for cutting-off

... unless you have one of the new heavy-duty, super high speed MARVEL Automatic Hack Saws. You are paying too much for cutting-off. No other machine of comparable accuracy will cut off an equal number of pieces from bar stock in diameter 10" with such speed, at such low labor cost, power cost, waste or with such small chip. Far heavier, and all built-in, these MARVEL Automatic Saws No. 6A and 9A are designed for continuous operation at speeds and feeds and blade tensions impractical for other equipment. They will cut off identical lengths, 10 pieces of 6" round, 160 pieces of 1 1/4" round every hour floor-to-floor, and other sizes proportionally. They cut off squarely and accurately—save stock and machining.

While strictly production tools that require no more attention than an automatic screw machine, MARVEL Automatics are also multi-purpose; will handle all runs of the shop sawing easily and efficiently—bar push-up can be disengaged at any point, miscellaneous cuts made, and automatic operation resumed by re-engagement of the bar feed drive. For miscellaneous sawing where the number of identical pieces does not justify an automatic bar push-up, MARVEL No. 6 or No. 9 will do the same low cost, high performance. Available with 4-speed belt drive, 4-speed motor drive, single speed motor drive or motor drive with 4-speed transmission.

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ARMSTRONG-BLUM M.

5741 BLOOM

CHICAGO

Profit by REMOTE CONTROL

THE BIGGEST IMPROVEMENT IN WELDING in years

Finger Tip Control at the Work Speeds Production... Improves Welds. Prove It With 30 Days Trial At Our Risk.

● With the Hobart Remote Control at his finger tips, the operator can control his work with 100 fine adjustments. Not only does this save time and money, but removes the temptation to "get by" with improper arc adjustments. Hobart's new "Multi-Range" Dual Control is another Hobart feature that makes better quality welding possible. These 2 exclusive Hobart advantages save time and cut costs.

Prove it in your shop with

30 DAYS TRIAL

Try a Hobart in your shop at our risk to prove it will soon pay for itself. No obligation.

HOBART BROS. CO., Box TB-119, Troy, Ohio

"One of the World's Largest Builders of Arc Welders."

Hobart Bros. Co., Box TB-119, Troy, Ohio
Send full information about the new Hobart controlled saving Arc Welder, particularly on the items checked below:

☐ Electric Drive ☐ Gas Drive ☐ "Build Your Own" To be used for _____ Amp. capacity.

Also information on ☐ Easy-to-Own Terms
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NAME _____
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CITY _____

FREE BOOKS

☐ How Hobart Controls
☐ How Profit in Arc Welding

HOBART

MARVEL SAWS

You are paying too much for cutting-off

... unless you have one of our new heavy-duty, super high speed MARVEL Automatic Hack Saws, you are paying too much for cutting-off. No other machine of comparable accuracy will cut off an equal number of pieces from bar stock in diameters to 10" with such speed, at such low labor cost, power cost, tool cost or with such small chip loss. Far heavier, and all ball-bearing, these MARVEL automatic Saws No. 6A and 9A are built for continuous operation at speeds and feeds and blade tensions impractical for other equipment. They will cut off identical lengths, 10 pieces of 6" round, 160 pieces of 1½" round every hour floor-to-floor, and other sizes proportionally. They cut off squarely and accurately—save stock and machining.

While strictly production tools that require no more attention than an automatic screw machine, MARVEL Automatics are also multi-purpose; will handle all run of the shop sawing easily and efficiently—bar push-up can be disengaged at any point, miscellaneous cuts made, and automatic operation resumed by re-engagement of the bar feed drive. For miscellaneous sawing where the number of identical pieces does not justify an automatic bar push-up, a MARVEL No. 6 or No. 9 will give the same low cost, high speed performance. Available with single speed belt drive, 4-speed belt drive, single speed motor drive, or motor drive with 4-speed transmission.

Send for catalog.

Profit by REMOTE CONTROL

THE BIGGEST IMPROVEMENT IN WELDING in years *Finger Tip Control at the Work Speeds Production... Improves Welds. Prove It With 30 Days Trial At Our Risk.*

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30 DAYS TRIAL
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 Send full information about the new Hobart cost-saving Arc Welder, particularly on the items checked below:
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 To be used for _____
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☐ New Hobart Catalog
☐ New Profile in Arc Welding

HOBART

At Last . . .

**A PRODUCTION MANAGER'S
DREAM COME TRUE!**

THE

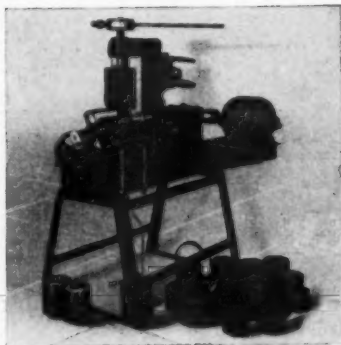
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**WRAPPING
ROLL**

It makes metal rings or cylinders so fast and so easily that production costs on these forms can be greatly reduced.

Use it for such items as gear rims, motor shell frames, ring gears, small tanks, roller bearing races, etc.

You'll wonder how you ever got along without it.



Write for Bulletin 3150

Buffalo Forge Company

**161 MORTIMER ST.
BUFFALO, NEW YORK**

**Canadian Blower & Forge Co.,
Ltd., Kitchener, Ont.**

UP TO THE MINUTE...

**Chicago Steel Brakes Are Modern
in Design and Sturdy Construction**



**BOX
AND PAN
BRAKE—**

Forms boxes or pans from one piece of metal. A straight brake as well as a box brake. Ideal for experimental shops.



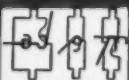
HAND BRAKE—

Improved to meet modern needs. Efficient and dependable — sturdy and durable.



POWER BENDING BRAKE—

Indispensable wherever a volume of heavy plate work is done—forms a great variety of bends and shapes without dies.



**FORMING
PRESS DIES**

We manufacture any type of die required for forming presses. Our die department will quote on any type to meet your needs. Submit blue print or sample of work.

36 Years' Experience..

building **STEEL CONSTRUCTED** sheet metal working machines are behind each **CHICAGO BRAKE**. They're built to give years of service.

ALL CHICAGO BRAKES are built of rolled steel welded sections which insure great strength, accuracy and long life. They are the most modern tools in design and workmanship to fit today's need for fast production sheet metal working machinery.

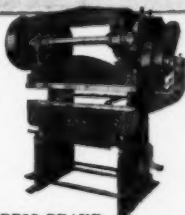
We Are The World's Largest Manufacturers Of Hand Bending, Power Bending And Power Press Brakes.

Aside from the **CHICAGO** line, we have built many special machines for intricate bending operations. Take advantage of our many years' experience by sending us any difficult bending problem you have.

DREIS & KRUMP MFG. CO.

7440 LOOMIS BLVD.,

CHICAGO, ILL.



SMALL PRESS BRAKE—

Compact, powerful money-saving production unit. Replaces cumbersome costly machines that are expensive to operate. Uses same dies as larger machines.



LARGE PRESS BRAKE—

The only press brake which turns out perfect work without shims and crowned dies. Patented non-deflecting bed equalizes pressure over the full bending length and overcomes major fault in solid bed press brakes.

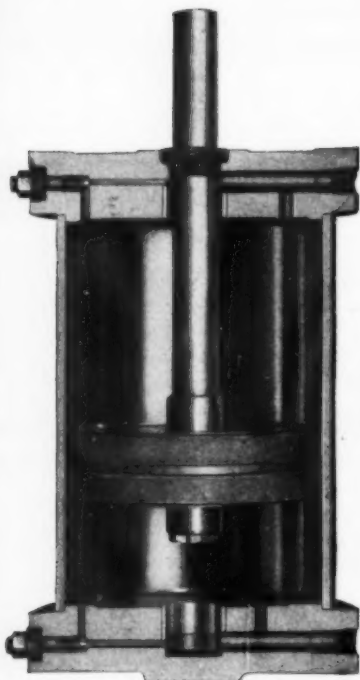
OVER 40,000

"CHICAGO" BRAKES in use by leading concerns—the world over

SJOGREN
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Hardinge

TOWARD
YOUR BETTER PRODUCT



announces

**HARD CHROMIUM
PLATED** *Cylinder
walls and piston rods.*

During intervals of non-use and before installation, cylinders are ordinarily susceptible to rust. From the various methods of preventing this condition, Hard Chromium plating was selected because, in addition to its ably solving the rust problem, it becomes an important factor in increasing the efficiency of the cylinder. The same moisture (from the condensation of compressed air) or water (when the cylinder is used for water-hydraulics) which would ordinarily cause corrosion, now acts as a lubricant on these hard chromium plated bodies and piston rods actually increasing the "slickness" of the surface. This in combination with the polished, smoother surface obtained means less friction and prolonged packing life. Of no less importance is the fact that these cylinders with this new feature are now being furnished at no extra cost.

More "service" features are described in our catalog No. 36-A. It will assist you in selecting the type of cylinder that will help you toward your better product.

this is a **TOMKINS-JOHNSON** *product*

Factory at 605 N. Mechanic St.,

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Agents in principal cities. T-J products also include Oil Hydraulic Cylinders . . . Remote Control Systems . . . Rotating Chucks and Cylinders . . . Rivitors . . . Clinchers . . . Special Equipment . . . Browne Coolant Pumps . . . T-J Die Sinking Milling Cutters.

SJOGREN

PRONOUNCED (SHOW-GRIN)

SPEED COLLET CHUCKS

for your TOOL ROOM and ENGINE LATHES

- Saves Time
- Increases Accuracy
- Increases Capacity

BEHOLD THE
ENGINE LATHES

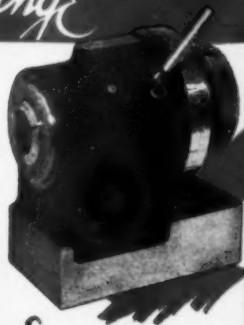
The amazing fast action of the Sjogren Speed Collet Chuck gives it full right to its name. An effortless turn of the hand-wheel, one way or the other, automatically opens or closes the collet, gripping or releasing the work as desired. With the Sjogren Speed Collet Chuck, the operator is always in front of his work and he stays there.

Supplied for direct mounting to either threaded or standard type of spindle nose. Available in three sizes to 1 1/2" capacity. A distributor is located near you. Write for his name and address.

Hardinge COLLET INDEX FIXTURE

1" capacity through collet. Index Plate has 24 holes. Furnished for other collets and with either 2, 3, 4, 5, 6, 8, 10, 12, 15 or 20 hole Index Plate. Available separately or with a Tailstock and Sub Base.

FOR LOW COST TIME SAVING ACCURACY CAPACITY ADAPTABILITY



Expensive holding devices for different operations are no longer necessary because Hardinge offers a Collet Index Fixture for many uses. Its adaptability to miller and grinding applications as well as its use with a shaper or drill press makes it indispensable in modern tool rooms and production departments and its low price justifies immediate use.

Price \$45.00

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HARDINGE

DRAW-IN COLLETS FOR ALL LATHES AND MILLERS



PRECISE DELIVERY FROM STOCK

FOR ACCURACY DURABILITY ATTRACTIVE PRICES

"SPECIFY HARDINGE COLLETS"

Write for Sample Pages for Your Requirements. Building and Engineering Departments. Also The Lathe and Milling Departments.

Hardinge Collets are in stock for immediate delivery. Hardinge Collets include close tolerances of precision which have distinguished our products since 1896.

HARDINGE BROTHERS, INC., ELMIRA, NEW YORK

COLLETS FEED FINGERS AND PADS FOR YOUR AUTOMATIC AND HAND SCREW MACHINES

MORRISON

COLLETS

FEED FINGERS



MORRISON MACHINE PRODUCTS DIV. HARDINGE BROTHERS, INC. ELMIRA, N. Y.

Make certain that you have this bulletin No. 37 which lists attractive prices and gives information and dimensions

Complete catalog No. 34 presents ordering information and attractive prices for standard and master collets and

CANEDY - OTTO

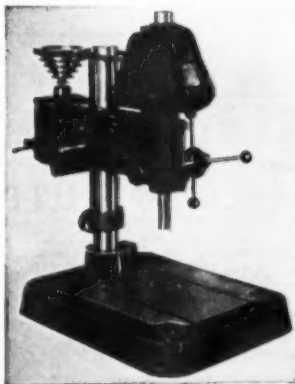
No. 18 ROYAL

Floor and Bench Model Drills



Featuring:

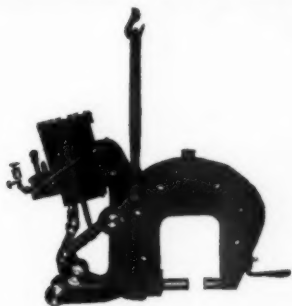
6 Speeds, 240 to 2185 with 1200
r. p. m. motor...345 to 3250
with 1800 r. p. m. motor.
18" swing 5 $\frac{3}{4}$ " spindle travel.
Sand cast, machined V-belt pul-
leys.
Alloy steel 6-splined spindle,
ground and polished.
High grade Lubri-seal ball bear-
ings throughout.
Spindle cone pulley rotates be-
tween annular ball bearings.
Bench base working surface 16"x
16", over all 21 $\frac{1}{2}$ "x28".



These are sturdy, dependable drills, capable of accurate drilling on rigid day-after-day production schedules. Supporting columns are rugged. The Lubri-sealed bearings assure easy running and long life. Working surface is handy—and the three spoke feed is fast and easy to operate. Capacity up to $\frac{3}{4}$ " with $\frac{1}{2}$ h. p. motor, or up to one inch with $\frac{3}{4}$ h. p. 1200 r. p. m. motor.

CANEDY-OTTO MANUFACTURING CO.
CHICAGO HEIGHTS, ILLINOIS

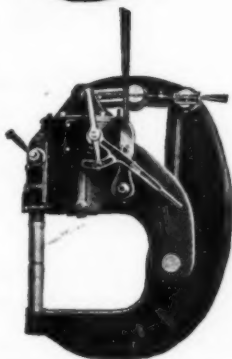
HANNA SQUEEZE RIVETERS



Small, light weight Squeezers or large, deep gap Stationary Machines. The line of Hanna Squeeze Riveters includes them all.



No previous riveting experience necessary as a Hanna Riveter sets each rivet with ONE stroke of the piston and with a predetermined pressure.



17—1" rivets per minute are easily set with the Shepard Pinch Bug Riveter illustrated. Rivets are inserted from above and headed from below. Compactness and light weight make it especially popular as a portable Squeezer.

HANNA ENGINEERING WORKS
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drilling in ALL sheet metals! Powerful motors maintain spindle speed whether loads are light or heavy—twist drills last longer because they're not sharpened as often. Try SKILSAW "SLOW-SPEED" Drills on your toughest jobs . . . and you'll never want any other kind.

SKILSAW, INC., 5035 Elston Avenue, CHICAGO

36 East 22nd St., New York; 182 Main St., Buffalo; 52 Brookline Ave., Boston; 15 So. 21st St., Philadelphia; 2124 Main St., Dallas; 918 Union St., New Orleans; 1253 So. Flower St., Los Angeles; 2065 Webster St., Oakland; 29 North Ave., N. W., Atlanta. Canadian Branch: 65 Deloraine Ave., Toronto



• Sold by leading distributors of mine, mill, hardware and contractors' supplies.

The New PROCUNIER

UNIVERSAL Tapping Machines

If you're seeking maximum production tapping, with accuracy, flexibility, dependability and economy, you'll be interested in the new PROCUNIER Universal.

It offers remarkable speed and precision tapping on production jobs, plus three revolutionary features:

1—Four speeds ranging from 395 to 2050 r. p. m., handling a wide range of jobs efficiently for which conventional high speed tapping machines are inadequate.

2—One machine handles tap sizes from No. 2 to $\frac{1}{2}$ " through two interchangeable tapping heads.

3—Extra long spiral compensating springs conveniently located, with wide range hand screw adjustments, maintain pre-set tap feeding and reversing pressures independent of operator.

Whether for highly specialized production, or work involving wide variations, the PROCUNIER Universal offers outstanding advantages.

Write TODAY for Catalogs 37 & 38.



PROCUNIER SAFETY CHUCK CO.
14 SO. CLINTON ST., CHICAGO, ILL.

Beatty

TOGGLE DRIVEN BEAM PUNCHES

FOR PUNCHING EXTRA LARGE STRUCTURAL SHAPES AND MANUFACTURED PARTS

Giving you the many advantages of toggle drive—delivering maximum punching force at the point in the stroke where it is most required—imposing a more uniform torque on the motor—permitting a smaller flywheel—reducing power consumption, cutting maintenance costs and saving floor space—as contrasted with units with drives of the eccentric type.

See how these BEATTY specifications compare with your requirements:

	No. 13	No. 14	No. 15
Face of slide, r to l, S'd.....	12 $\frac{1}{4}$ "	12 $\frac{1}{4}$ "	13"
" " " Maximum	24	24	34
" " " front to back	48	60	60
Die space	42	48 $\frac{1}{2}$	48 $\frac{1}{2}$
Stroke	2	2 $\frac{1}{2}$	3
Throat	25	28 $\frac{1}{2}$	34
Face of table, front to back	46	60	64
" " " r to l, S'd	22	22	28
" " " Maximum	30	34	38
Capacity	200T	300T	400T
Shipping weight, lbs.	42,000	57,000	76,000
Motor required, H.p.	7 $\frac{1}{2}$	10	15
Spacing table to suit requirements			

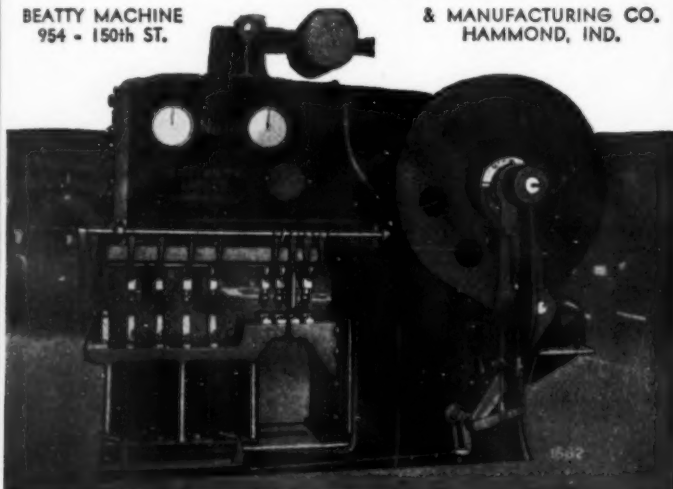
Punching capacity

2 holes 1 $\frac{1}{8}$ " thru 1" 4 holes 1 $\frac{1}{8}$ " thru $\frac{3}{8}$ " 4 holes 1 $\frac{1}{8}$ " thru 1 $\frac{1}{2}$ "

Send for Folder 1500-A giving full information.

BEATTY MACHINE
954 - 150th ST.


& MANUFACTURING CO.
HAMMOND, IND.





... Maintaining
HIGH
PRODUCTION
..... and Keeping Costs Low

—that's why users
production milling
machines depend
Brown & Sharpe Cutter
... both Stock and Spec

 Write for Catalog 33—Brown & Sharpe Mfg.
Providence, R. I. U.S.A.

BROWN & SHARPE

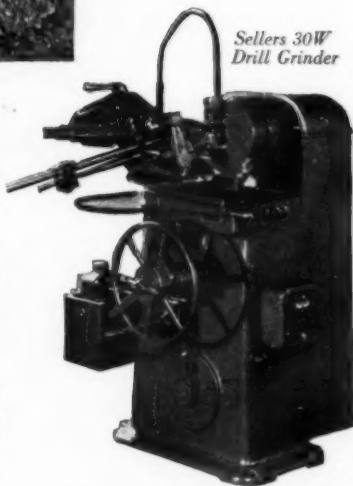


**Correct angle
of inclination
is also im-
portant for
*Drill Points***

ACCURATE holes, drilling speed, drill life . . . all depend on the accuracy of the angle of inclination of drill lips. Angles too large or too small, unequal angles, result in slower drilling, oversized holes and premature breakdown of drill points.

Sellers method of grinding is inherently accurate. It automatically produces the correct drill point required for your work, with equal angles of inclination and identical lips . . . drill points that will last longer, drill faster and produce holes with absolute precision.

Eliminate the costly waste caused by incorrectly ground drill. Investigate Sellers Drill Grinders . . . they are used and recommended by all leading drill manufacturers.



*Sellers 30W
Drill Grinder*

WILLIAM SELLERS & CO., Incorporated
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Sellers

APEX

FLOATING TOOL HOLDERS

The use of Apex Floating Tool Holders is a sure method of producing uniform and accurately reamed holes. Apex Floating Tool Holders can be used on any machine in any position. Friction in the holder is practically eliminated by the patented ball drive.

All parts are hardened and ground, and are interchangeable. The amount of float may range from a few thousandths to $\frac{1}{8}$ ".

Shanks may be had in any taper or straight diameter, adapter shanks to General Motors or Chrysler Motor standards, key drive or special drive to suit machine spindle. Sockets may be had for Morse Taper or Straight shank tools.

Available with square drive collets, interchanging with those used on Apex Safety Friction Tapping Chucks, Positive Drive Chucks and Vertical Float Chucks, and with collets interchangeable with Quick Change Drill Chucks. Tap capacities to $2\frac{1}{4}$ "; reamer capacities to 5".

Write for Catalog No. 8.



**Quick Change
Collet Type**



**Extended
Socket Type**



Short Nose Type with Morse Taper Sockets

The APEX MACHINE & TOOL Co.
Dayton, Ohio

LONG STROKE— —LOW PRICE

Order files are swelling and production is being forced more and more. All of this emphasizes the need of small presses to handle the small work—to prevent tying-up the larger presses with the smaller jobs.

Rousselle Presses are designed especially for trimming deep die castings and all other types of deep draw work within their capacity—jobs that otherwise require large, heavy presses because of the long stroke needed.

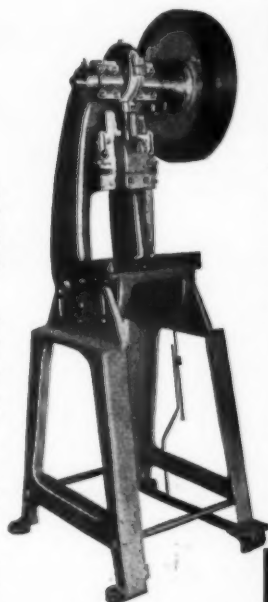
Rousselle Presses are speedy, versatile and dependable—economical in first cost and in operating cost.

With automatic feed, 10,000 operations per hour are possible. NON-REPEAT CLUTCH stops after each stroke, or can be set to operate continuously.

Remember Rousselles are the only inclinable punch presses obtainable at these low prices.

Check These Specifications:

Weight.....	450-lbs.
Crankshaft diameter at main bearings.....	4"
Diameter of crankshaft.....	1 1/4"
Flywheel weight.....	120-lbs.
Speed.....	300-r. p. m.
Diameter of flywheel.....	16 1/2-inches
Ram standard stroke.....	2-inches
Adjustment of ram.....	2-inches
Size of bottom of ram.....	3x3"
Ram to bed; stroke down adjustment up.....	6 1/4"
Size of hole in ram for punch.....	1 1/4"
Bed size.....	8x12"
Depth of throat to center of ram.....	4-inches
Size of opening between press frame at back.....	6-inches
Inclinable angle from right angle.....	30-degrees
Height.....	36-inches
Thickness of bolster plate.....	1-inch



Compare These Prices:

No. 0 Rousselle
\$100

No. 1 Rousselle
\$150

(less motor and Stand;
Stand No. 0 \$15.00 extra;
and No. 1 \$25.00)

Specially designed guard
for motor drive—\$10.00

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Giving Full Details.

DAVID J. ROSS & CO.,

**BENTON HARBOR,
MICHIGAN**

WHITNEY

Whitney manufactures more than 80 types of Shears, Punches and other tool equipment for metal working—dependable items perfected through long experience and close contact with the trade—tools that have “always made good.”

TOOLS



No. 10 Ball Bearing Punch

Capacity $\frac{1}{8}$ inch through $\frac{1}{4}$ inch iron. Depth of throat $1\frac{1}{8}$ inch. Height of throat $\frac{3}{8}$ inch. Furnished with one punch in any size from $\frac{1}{8}$ to $\frac{1}{2}$ by $1/32$.



Angle Mitre Notcher and Angle Iron Bender

Capacity $2'' \times 2'' \times \frac{1}{4}''$ angle iron or smaller. A pair of tools that every shop ought to have. They are Nos. 50 and 51 in our catalog.

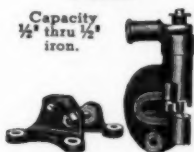


No. 4 Angle Iron Shear

Capacity $2'' \times 2'' \times \frac{1}{4}''$ angle iron or smaller.

No. 20 Ball Bearing Punch

Capacity $\frac{1}{2}''$ thru $\frac{1}{2}''$ iron.



Imperial Roller Bearing Punches

—offered in 3 sizes—will work inside 90 degrees. Quick changing for punches and dies —no cams to wear—stripping action is positive.



Aircraft Rivet Squeezer

Capacity $\frac{1}{8}$ inch aluminum rivet. Spindle travel $13/16$ inch. Made in 5 sizes, with throat depths from $1\frac{1}{4}$ to 6 inches.

Send for the complete Whitney Catalog.

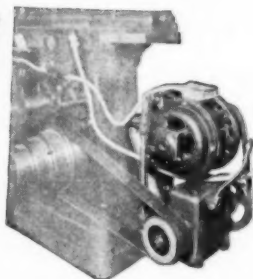


WHITNEY METAL TOOL COMPANY
115 FORBES ST., ROCKFORD, ILLINOIS

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Berkeley leads again!

**WITH THE *ONLY*
COMPLETE LINE OF
MOTOR DRIVES . . .**



**Any Size
Any Type
Any purpose
Any Machine**

No one drive fully meets every operating condition. Berkeley can furnish the correct drive for your machine and job.

The V-Belt and V-Belt-Helical Gear Combination Drives are simple and efficient.

The P. O. S. Drive (Positive Optional Speed) provides for machines where the in-between spindle speeds may be required to turn a loss into profit.

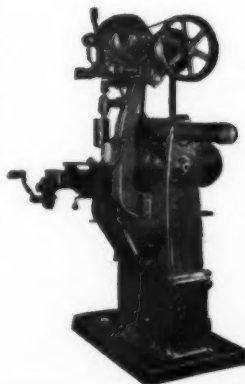
The Quick Change Gear Drive—A powerful, compact unit that solves many production problems.

All Berkeley Drives are mounted on welded steel brackets individually designed for each machine.

Attachment is simple and quick.

Adjusting screws provided for ease of alignment.

Write today for Bulletins.



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1381 E. 17th ST., CLEVELAND, OHIO

DOES MORE JOBS A DAY- FOR MORE DAYS!

It's *portable*—easy to move from job to job. It's *fast*—smooth and vibrationless at each of its variable speeds. It's *versatile*—handles wheels up to 6 inch diameter and $\frac{3}{4}$ inch face for work on welds, castings, marble, concrete and fabricated metals. And it's de-

pendable—developed and manufactured by Haskins for long years of trouble-free service. If there's a bothersome grinding, polishing or wirebrushing problem in your plant, maybe H-6 is the answer. Why not find out?



EQUIPMENT FOR EVERY NEED

Direct and countershaft drives—bench, truck and ceiling-suspended mountings. The complete line of Haskins Flexible Shaft Equipment and many diverse applications are illustrated in Booklet No. 44. Write for it. R. G. Haskins Company, 623 S. California Ave., Chicago.



HASKINS FLEXIBLE SHAFT EQUIPMENT TYPE H-6

MOTOR—Full $\frac{1}{2}$ HP, ball bearing, repulsion induction, 1725 RPM.

SPEEDS — 825, 1225, 2400, 3400 RPM from 4 speed Timken bearing countershaft.

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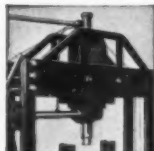
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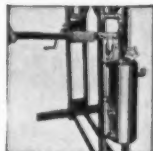
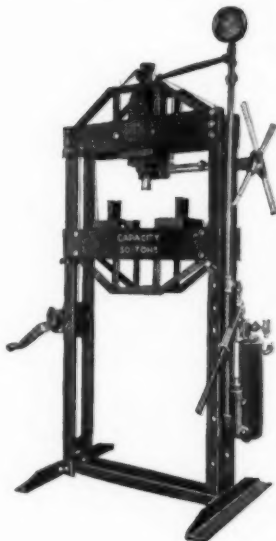
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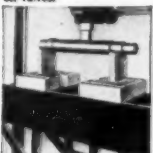
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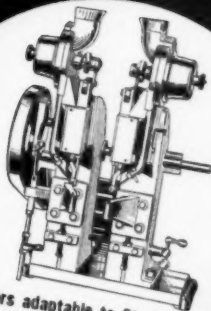
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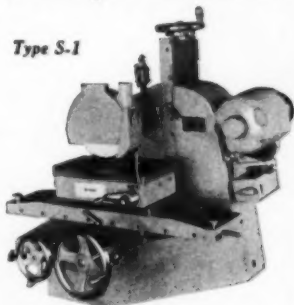
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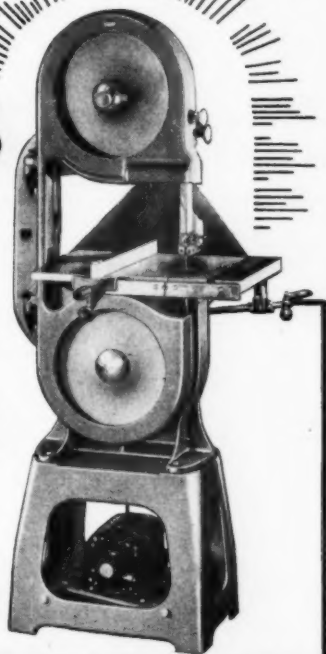
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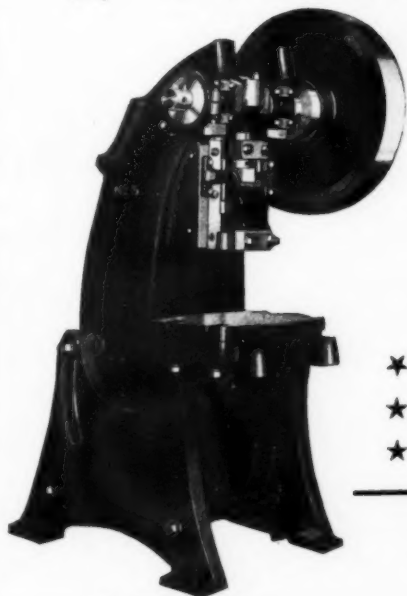
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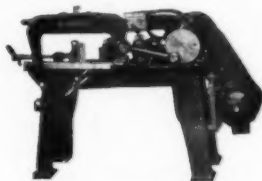
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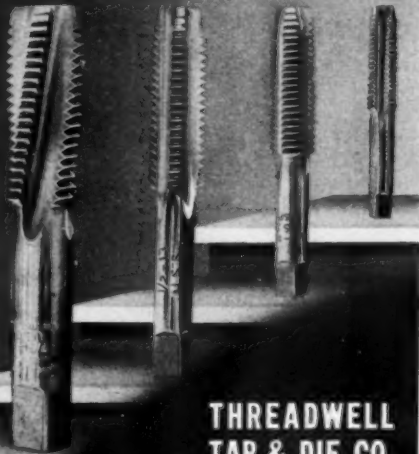
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CONTENTS

Modern Grinding in the Modern Tool Room	
Part 1 . . by Russel A. Reed	31
Building The Antarctic Snow Cruiser	57
Glass Fiber Insulation	60
N. M. T. B. Opposes War	65
Per Cent of Thread Chart	53
The Editor's Page	29
New Equipment	69
Buyers Directory	136-145
Buyers' Service	142
Index of Advertisers	177-178

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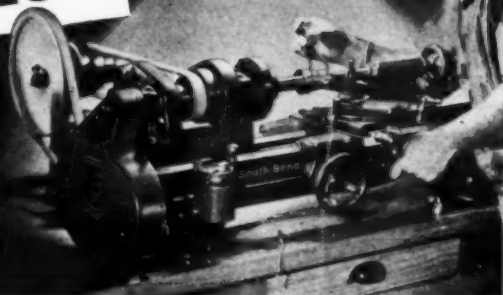
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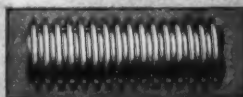


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The EDITOR'S PAGE



Heavy manufacturing industries have budgeted hundreds of millions for capital improvements to keep abreast of the rise in business activities.

Directly and indirectly, a large share of this will benefit makers and users of machine tools.

A gratifying aspect is that most of these expenditures will be in preparation for the manufacture of domestic products used in normal peace time pursuits.

Machines that have been growing more and more obsolete will be replaced with speedier and more efficient production equipment. With the increase in manufacturing tempo, improvement is necessary in many cases for survival. New products will be developed. Existing lines will be refined, improved and reinforced with new sales appeal.

Payrolls will continue to swell and that means more and more of the modern comforts, aids and conveniences will become available for more people.

There is no quibbling though about the positive stand American people and American industry have taken on the subject of war. Neither wants any part of it.

Turning down transient profits, industry spurns traffic in the instruments of death and destruction. Aside from moral issues, the temporary financial gain does not justify dislocation of production and the peril of involvement.

Building arms and armament for self defense is something else again. That is an imperative call to which American industry will respond with every resource.

Business Indexes Soar . . .

The index of industrial production has passed the 1929 average. It is high-

er than for the so-called normal years of 1923-5—some 50 points above the depths of the 1938 "recession" and two points higher than the best showing in 1937, which was rated as a good year. Indications are that it may reach an all-time high sometime in December.

Ordinarily, factory production is a reliable gauge of business prospects. At present, the situation indicates an amazing upswing in steel. Tonnage of ingots during October should set a new high.

This steel is going into stocks rather than to war. The auto builders and railroads are buying because they anticipate price increases and delivery delays later as a result of war demands. The pace can hardly be maintained. Normal steel exports run about five percent of production and if doubled in the near future, this would account for only about 10 percent of our production capacity, which is hardly enough for a boom.

Movements are underway to ward off unjustified price increases resulting from the expansion. It is being recommended generally that profits should come from increased volume rather than price increases.

Already, manufacturers in the machine tool field have issued formal assurances against unjustified price increases. James F. Lincoln, President of Lincoln Electric Co., and A. Wyzenbeek of Wyzenbeek & Staff have pointed out the devastating effects of post-boom deflations.

Sampson a Piker . . .

An anonymous contributor asserts: "Sampson was a piker. He killed a thousand men with the jaw bone of an ass."

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RYERSON

Modern Grinding in the Modern Tool Room

In Two Parts—Part I

By Russel A. Reed,

(Norton Company, Worcester, Mass.)

GRINDING in the modern tool room has become a highly technical operation. As the metallurgists have developed new metals for cutting tools, the grinding wheel manufacturers have developed new wheels to grind them. No longer will a few wheels in a few different grain sizes and grades of hardness suffice. The tool room worker of today may use as many as four abrasives, several bonds and a variety of sizes, shapes, grains and grades of wheels in each.

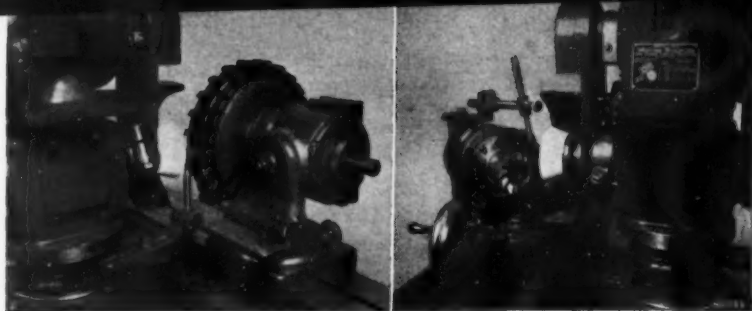
For example, he will use wheels of regular aluminum oxide abrasive for all jobs on steel where the pressures are

fairly high, such as sharpening drills and the offhand grinding of lathe and planer tools. For milling cutters, reamers, chasers, hobs, broaches and the like, he'll use wheels of a special type of aluminum oxide abrasive. When grinding tools tipped with any of the cemented carbides he'll turn to wheels made of green silicon carbide abrasive or wheels made of genuine diamonds.

As the selection of the correct wheels for each job, and also their proper use are both vital to efficient and economical tool room grinding both aspects of the subject will be discussed in this ar-

(Left) Sharpening a large drill on a pedestal type drill grinder. (Right) Reclaiming a burned drill by cutting off the end with a resinoid bonded cut-off wheel and repointing.





Grinding the periphery of the blades of an 11" face milling cutter—and beveling the corners of the teeth of a shell end mill.

ticle. The physical characteristics of the wheels themselves will first be covered and then a brief description of their application on typical tool room jobs.

The Abrasives

The abrasives in grinding wheels may be classified into two general groups—the aluminum oxide and the silicon carbide abrasives. Both are products of the electric furnace, but differ materially from each other. Silicon carbide abrasive grains are intrinsically harder but are also more brittle. Aluminous abrasive grains, while not so hard, are tougher and do not fracture so easily and are thus able to withstand greater stress.

As a result of this difference in physical characteristics, aluminum oxide abrasive wheels are used for grinding steels of all kinds and other materials of relatively high tensile strength. Silicon carbide abrasive wheels are generally selected for grinding hard and brittle materials such as cast iron, the cemented carbides, and metals of low tensile strength such as brass, soft bronze and aluminum.

Most grinding wheel manufacturers produce two or three principal types of aluminum oxide abrasives possessing individual characteristics, principally with respect to "temper" or friability, which make each abrasive adaptable to different classes of work. For example, there is a special type of aluminum oxide abrasive that is more highly refined and of a slightly porous nature. It is thus more friable than regular aluminum oxide abrasive,

which is tough and capable of heavy duty grinding. As a result, this special type has a cool cutting and almost self-dressing action. It is the most suitable type of abrasive for the majority of tool room operations on high speed steels and steel alloys. The principal exceptions are the off-hand grinding of lathe and planer tools and drill grinding where the greater pressures used call for the greater strength of regular aluminum oxide abrasive.

There are two types of silicon carbide abrasive in common use. In addition to the familiar gray—almost black-colored silicon carbide, there is a green-colored variety which is especially suitable for grinding cemented carbide tipped tools.

The Bonds

There are five different processes of bonding grinding wheels, namely, vitrified, silicate, resinoid, rubber and shellac. Each type of bond imparts distinct characteristics to the grinding action of the wheel. With this variety of bonds, therefore, it is possible to produce wheels that will meet most effectively the specific grinding requirements found in the modern tool room. The larger grinding wheel manufacturing companies can furnish wheels in all five bonds while some of the smaller companies specialize in one or more types.

Vitrified Bond

Most grinding wheels are made with a vitrified bond, which consists of a mixture of carefully selected clays. At the high temperature produced in the burning kilns, the clays mixed with the

abrasive grain, fuse into a molten glass condition. On cooling, a span of this glass attaches each abrasive grain to its neighbors and supports them while they grind. Most grinding wheel manufacturers have several varieties of vitrified bond with one or more of them especially suitable for tool grinding wheels.

Silicate Bond

Silicate (silicate of soda) bonded wheels have a milder cutting action than vitrified wheels and are especially suited for grinding fine-edge tools such as knives and cutlery and for any operation where there is a broad area of contact, or where the heat generated in grinding must be kept down to a minimum. In the tool room they are found on some of the large wet tool grinders.

Resinoid Bond

Resinoid bonded wheels are designed to operate at 9000 to 9500 surface feet per minute. Because of their fast cutting ability at these higher speeds, they are particularly suited for snagging castings and for other heavy duty operations. Resinoid bonded cut-off wheels are popular for cutting all kinds of materials. On proper equipment, such wheels can be safely operated at speeds as high as 16,000 s. f. p. m.

More recently, resinoid bonded wheels have been applied successfully to the grinding of large milling cutters. For this work they are operated at normal machine speeds.

Rubber Bond

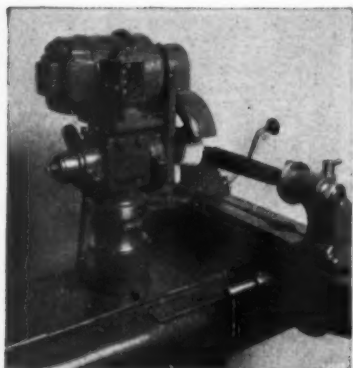
Rubber bonded wheels also are capable of rapid stock removal when operated at high speed. Their grinding action is characterized by a certain smoothness and as a result, they are used to a large extent on work where a high quality of finish is required, as on ball and roller bearing races. In the tool room, they are used principally for fluting taps and for wet cutting-off operations.

Shellac Bond

Shellac bonded wheels grind with a

(Top) Grinding the side of a side milling cutter. (Center) Regrinding the flutes of a tap. Note the tooth rest blade. (Bottom) Grinding the faces of the blades of a face milling cutter.





burnishing or buffing action as a result of the bond softening under the heat of grinding.

They are therefore capable of producing high finishes such as are required on camshafts and cold mill rolls. They are also widely used for grinding cutlery and for "gumming" saws in lumber mills.

Specifications

All grinding wheels are made up of three elements:—abrasive grain, bonding material, and pores. By the term "specifications" is meant the choice of these three elements which are described more fully in the following paragraphs.

A number is used to designate the size of individual abrasive grains in the wheel. This number corresponds to the meshes per linear inch in the screen employed in sizing the abrasive particles. For example, a grinding wheel of 36 grit contains abrasive grains that will just pass through a screen having 36 openings to the linear inch, but are retained on the next or 46 mesh screen.

Grain Sizes of Abrasives

Very Coarse	Coarse	Medium	Fine	Very Fine	Flour Sizes
8	12	30	70	150	280
10	14	36	80	180	320
	16	46	90	220	400
	20		100	240	500
	24		120		600

The finer flour sizes are classified by hydraulic separation. Combinations of various grain sizes are often used to produce a desired refinement in grinding action.

Grade (Hardness)

The abrasive grains in a grinding wheel are held in place by posts of bond. If these bond posts are very strong and are capable of retaining the grains against the grinding forces tending to pry them loose, the wheel is said to be of a hard grade. On the other hand, if only a small force is needed to release the grains, the wheel is said to be of a soft grade.

In the method of marking wheels most commonly used, the grade letters for all types of wheels range from E

(Top) Grinding a taper reamer. (Center) Sharpening a double angular cutter. (Bottom) Sharpening a spiral milling cutter.

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(very soft) to Z (very hard).

Very Soft E,F,G	Soft H,I,J,K	Medium L,M,N,O	Hard P,Q,R,S	Very Hard T,U,W,Z
-----------------------	-----------------	-------------------	-----------------	-------------------------

Inasmuch as this system is employed by practically all of the grinding wheel manufacturers it will be used for the specific wheel recommendations that follow in this article.

It should be understood that grade is not an exact value. Actually, it is a range between narrow limits, and all wheels that come within the range designated by any particular letter are considered to be of one grade and carry the same grade letter.

Factors Affecting Selection

The following is an outline of the factors which govern the selection of the various elements of a grinding wheel, viz., the abrasive, grain size, grade, structure and type of bond. It should be understood, however, that the rules and conditions set down are quite flexible and that occasionally exceptions will occur.

1. Factors Affecting the Selection of Abrasive

A. Physical properties of material to be ground	(Use aluminous abrasive wheels for materials of high tensile strength)	(Carbon steels High speed steels Alloy steels Stellite Malleable iron Hard bronzes, etc. Gray iron Chilled iron Brass and soft bronze Aluminum Cemented Carbides)
	(Use silicon carbide abrasive wheels for materials of low tensile strength)	

2. Factors Affecting the Selection of Grain Size

A. Physical properties of material to be ground	(The softer and more ductile the material, the coarser the grain size.)
B. Amount of stock to be removed	(The larger the amount of stock removal, the coarser the grain size.)

*Exception — Very hard materials where depth of grain penetration is necessarily small.

(The better the finish required, the finer the grain size.)

C. Finish required... (grain size.)

3. Factors Affecting the Selection of Grade

A. Physical properties (The harder the material, the softer the grade should be.)

B. Area of contact between wheel and work (The smaller the area of contact, the harder the grade should be.)

(The higher the work speed with relation to wheel speed, the softer the resulting grinding action and the harder the grade should be.)

C. Wheel speed and work speed (The presence of vibration and worn master parts usually calls for a harder grade of wheel than would be required on a machine in good condition.)

D. Condition of the grinding machine (With the proper coolant, a harder grade of wheel can usually be used.)

4. Factors Affecting the Selection of Bond

The vitrified type of bond is most generally used. However, in some instances, operating and performance requirements make the selection of other types of bonds advantageous or essential.

(Thin cut-off wheels and others subjected to bending strains require resinoid, shellac, or rubber bonds. Solid wheels of very large diameters require silicate bond.)

A. Dimensions of wheels (Exception—In machine grinding, reasonably fine finishes are obtainable with medium or even relatively coarse grit wheels by dressing the wheel fine with a diamond and properly adjusting the wheel and work speeds.)

(Vitrified wheels are usually best for speeds up to 6500 s.f.p.m.; resinoid, shellac and rubber wheels for speeds above 6500 s.f.p.m.)

B. Wheel speed (Resinoid, shellac or rubber bonds are generally best for high finishes.)

C. Finish required ... (rubber bonds are generally best for high finishes.)

Standard Types of Grinding Wheels

Shown in Fig. 1 are cross sections of six standard types of grinding wheels which are representative of the various shapes that are most commonly used for tool room grinding. The six types of wheels are numbered and each dimension designated by a letter in accordance with the standards of the Grinding Wheel Mfrs. Ass'n. The key to the dimension letters is shown on this page.

This classification of grinding wheels greatly simplifies the stocking of wheels wherever a quantity is kept on hand. It also enables the user to order a grinding wheel accurately by giving the type number and dimensions as designated by the cross section of that type.

Key to Letter Dimensions

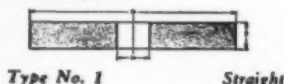
- A — Flat Spot of Beveled Wall.
- D — Diameter (Over All).
- E — Center or Back Thickness.
- F — Depth of Recess.
- (See Type 5).
- G — Depth of Recess.
- H — Arbor Hole.
- J — Diameter of Flat or Small Diameter.
- K — Diameter of Flat Inside.
- M — Large Diameter of Bevel.
- P — Diameter of Recess.
- R — Radius.
- T — Thickness (Over All).
- U — Width of Face.
- V — Angle of Bevel.
- W — Thickness of Wall.

Grinding Wheel Speeds

It is good practice to operate a grinding wheel as near to the speed recommended by the maker as possible. In

general, for cylindrical grinding, wheels should be run from 5500 to 6500 surface feet per minute; for surface grinding from 4000 to 6000 s.f.p.m.; for cutter grinding from 4500 to 6000 s.p.f.m. and for wet tool grinding from 5000 to 6000 s.f.p.m.

The grain, grade and structure usually recommended for any certain operation are based on the assumption that approximately the recommended speed will be employed. If for some reason this is not possible, then the grade at least should be changed to con-



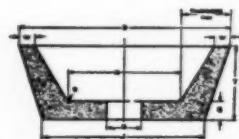
Type No. 1 Straight



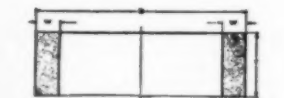
Type No. 6 Beveled Face



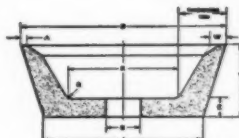
Type No. 1 Cut-off



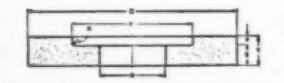
Type No. 11 Flaring Cup



Type No. 2 Cylinder



Type No. 11 Beveled Face



Type No. 5 Recessed One Side



Type No. 6 Straight Cup



Type No. 12 Dish

Fig. 1. — Standard shapes of wheels commonly used in tool grinding.

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form to the different speed.

Truing and Dressing the Grinding Wheel

These two terms are sometimes confused in the minds of grinding operators. Truing means removal of material from the cutting face of a wheel so that the resultant surface runs absolutely true. Dressing is the operation of cleaning or restoring the sharpness of the wheel face that has become dulled or loaded with the material being ground.

Truing can be accomplished best by the use of a diamond dressing tool rigidly supported in a fixed tool post. For certain classes of work, where an ordinary finish is acceptable, mechanical or abrasive wheel dressers have been found to be cheap and effective substitutes for the diamond. Obviously, the accuracy of such rotary truing devices is in direct proportion to the condition of their bearings.

Wheels used on tool and cutter grinding machines are preferably trued and dressed with a diamond. A hard diamond point in the dressing tool fractures the abrasive grains on the face of the wheel, or removes the dull grains entirely and thus allows new, sharp cutting points to be presented to the work.

For dressing large tool sharpening wheels, the Huntington type of dresser, rigidly supported on the work rest, is recommended. Small tool room wheels, including cutter grinding wheels, are commonly dressed and rough formed with a suitable silicon carbide abrasive stick applied by hand.

Sharpening Milling Cutters and Reamers

In general, it may be said that the working efficiency of a cutter is largely determined by the keenness of its cutting edges. Consequently, it is important to sharpen a cutter at the first signs of dullness. A dull cutter not only leaves a poorly finished surface, but the continued use of such a cutter leaves it in a condition where it becomes necessary to grind away a considerable portion of the teeth to restore the cutting edges. When the cutter is maintained in good working con-

dition by frequent sharpening, it is certain to be cutting rapidly and effectively at all times. Furthermore, when such a cutter does need resharpening, it is necessary to grind the teeth only a very small amount to insure keen cutting edges.

Cutters and reamers are usually ground on tool and cutter grinding machines. The universal type of cutter grinder, as the name implies, can be set up for a variety of grinding operations, including light cylindrical, surfacing and internal, as well as for sharpening cutters of all kinds, reamers, etc.

The grinding machine for sharpening cutters should be kept in good repair. Wheel spindle must be free-running, but the bearings should be snug so that there is no tendency to chatter, nor must there be any end play. Table ways must be kept straight and true if accurate work is to be obtained. The tooth rest should be substantial enough to avoid springing and the tip shaped so as to provide a smooth and solid contact under the tooth that is being sharpened.

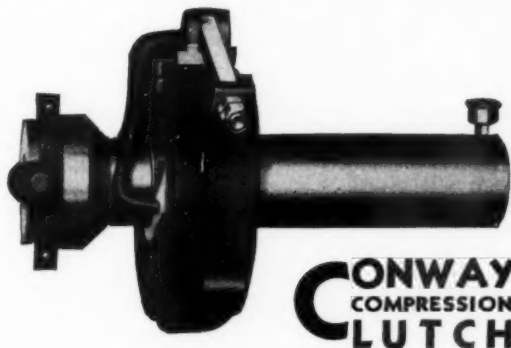
Grinding Wheels Recommended

For all grinding operations on high speed steel cutters, reamers and the like, the special type of aluminum oxide abrasive is recommended because of its cooler cutting action.

The grade of the grinding wheel used for sharpening cutters must be in the soft range to insure a free cutting action and to avoid drawing the temper of the cutting edge. At the same time, if the wheel is too soft, its rapid wear makes it difficult to keep the cutter a true cylinder or to produce a keen edge.

46-K, 46-J and 60-I special aluminum oxide abrasive, vitrified bond, in the order named, are the most popular specifications of small straight cup and tapered cup wheels for sharpening carbon steel, high speed steel and Stellite cutters of the profile types, which are ground on the back of the cutting edge. Included in this class of cutters are plain and side milling cutters, end mills, reamers, etc. When the machine set-up calls for a straight wheel, 46-K or 46-L is most commonly used.

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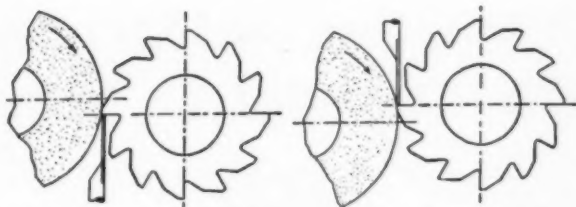
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Fig. 2 and 3.—
Method of grind-
ing with wheel
rotating off the
cutting edge and
Grinding with
wheel rotating on
to the cutting
edge.



Formed cutters, including rotary gear cutters, are generally ground with dish shaped wheels, such as 46-J or 60-I special aluminum oxide abrasive, vitrified bonded. For sharpening Fellows gear shaper cutters, slightly finer grit wheels, such as 80-I should be used.

Dry grinding is recommended for all high speed steel cutter sharpening operations, as it has been found that water will cool the cutting edges too rapidly and cause cracking.

Direction of Wheel Rotation

Cutters and reamers may be ground with the grinding wheel rotation either toward or off the cutting edge as shown in the accompanying illustrations.

If the wheel is run off or away from the cutting edge as shown in Fig. 2, the wheel holds the cutter against the tooth rest. As this is the safer method, it is more commonly used. However, it has the objection of throwing up a burr on the cutting edge of the tooth which should be oilstoned off. Furthermore, there is some danger of burning the tooth at the cutting edge.

If the cutter is ground by rotating the wheel on to the cutting edge as shown in Fig. 3, there is less tendency to burn the tooth and a keener cutting edge, free from burr, is possible. However, care must be taken to hold the cutter firmly against the tooth rest as otherwise the rotation of the wheel will carry the tooth into the wheel and cause it to be ground away.

While straight wheels are considered in the foregoing, the same comments regarding direction of grinding wheel rotation apply to the use of cup wheels.

Clearance

Clearance or relief may be defined

as the amount of stock removed from behind the cutting edge to permit the teeth to cut freely and to clear the material after the cutting edge has done its work.

It is important that the clearance be correct. If it is insufficient, the teeth will have a dragging cut, while if it is too great, the teeth will wear rapidly and the cutter is likely to chatter. Too much clearance, however, is less objectionable than too little.

The proper angle of clearance depends upon a number of factors, principally the type and diameter of the cutter and hardness of the material to be machined. For example, cutters employed on soft materials like brass can stand more clearance than those employed on steel or cast iron. Likewise, the clearance must be greater for small cutters than for large ones. For these reasons, it is generally agreed that the correct clearance angle for a given cutter must be determined by experience. Once the clearance angle (as well as cutting speed and feed) that gives the best results on a certain operation has been determined, it should be recorded for future reference.

As a general rule, the clearance angle should be from 6° to 7° for cutters up to 3" in diameter and from 4° to 5° for cutters larger than 3". The following table may also be used as a guide in selecting the proper clearance angle according to the material to be cut by the tool being ground:

Low Carbon Steels	5° to 7°
High Carbon and Alloy Steels ..	3° to 5°
Steel Castings	5° to 7°
Cast Iron	4° to 7°
Brass and Soft Bronze	10° to 12°
Medium and Hard Bronze	4° to 7°
Aluminum	10° to 12°

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Typical Set-Ups for Sharpening Cutters

To give the reader a general idea of the methods commonly employed in the setting-up and sharpening of cutters, reamers and similar tools, a number of typical set-ups are shown, together with brief descriptions of the set-ups and the grinding procedures.

Plain (Spiral) Milling Cutters

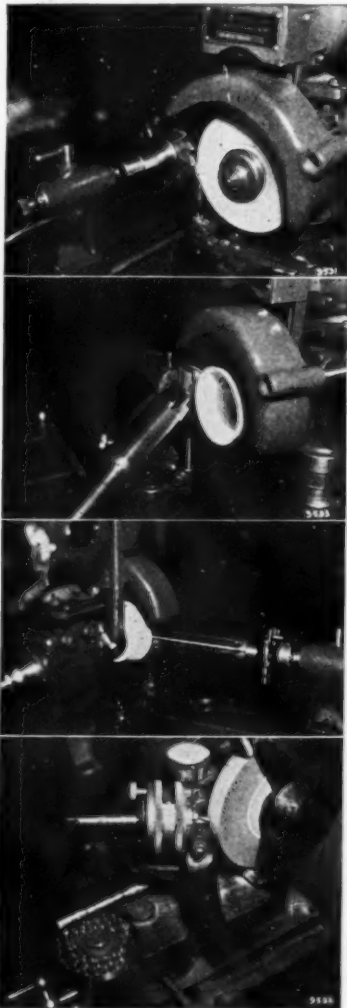
The cutter is mounted on an arbor, supported between centers and set sufficiently below the center of the wheel spindle to provide the desired clearance. The tooth rest must be mounted on the wheel head and adjusted so that it has a complete bearing on the tooth to be ground, on the vertical center line of the wheel. This brings the cutter, wheel and work into contact at a common point. Holding the cutter against the tooth rest with a slight hand pressure to maintain a uniform spiral, the cutter is traversed across the wheel face, either by moving the table or sliding the cutter on a cutter bar.

In sharpening plain milling cutters the greatest difficulty lies in keeping the peripheral cutting edges radially equal (a cutter out of truth cuts with a constant pounding action). If wheel wear during the sharpening operation is equalized, it follows that the cutter is kept cylindrical. This is achieved by grinding around the entire cutter, then revolving it 180°, starting anew on a tooth just opposite the original starting point and taking another light cut all the way around the cutter. This method is repeated, taking light cuts until the cutter has been sharpened sufficiently.

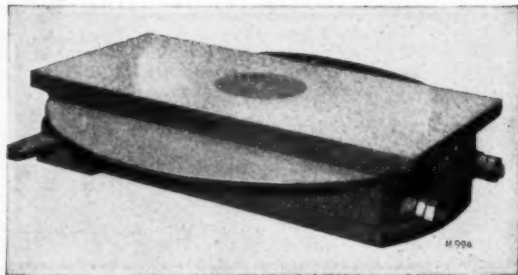
A cup wheel can also be used for grinding plain cutters. It possesses the advantage of producing a straight angle of clearance back of the cutting edge. To prevent the opposite side of the cup wheel from striking the cutter, the wheel head should be swiveled slightly from the zero line.

Some tool rooms have found that cutters for use on steel and cast iron will cut with less chatter and stand up longer between regrinds, if they

(The illustrations—top to bottom) Sharpening a staggered tooth milling cutter—Grinding the corners of a chucking reamer—Grinding an expansion type of hand reamer (note the adjustable center) and Sharpening a small drill on a bench type of drill grinder.



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are first ground cylindrically and then backed off to leave a land from .005" to .010" wide at the cutting edge.

Staggered Tooth Milling Cutters

Staggered tooth milling cutters, having alternately right and left-hand spiral teeth, may be sharpened at one set-up by using a tooth rest with the top of the blade, either rounded or shaped with a double angle. The operation is similar to grinding a plain spiral mill, with the cutter mounted on an arbor between centers and the tooth rest fastened to the wheel head.

Side Milling Cutters

The cutter is mounted on a stub arbor and clamped in the Vee of the combination attachment or in the universal work head, which is swiveled to the required angle of clearance. The tooth rest is usually fastened to the work head.

Face Milling Cutters

While special machines of suitably heavy construction are available for sharpening large face milling cutters, if they are not too large they may be sharpened on a universal tool and cutter grinder. They should be mounted on a tapered shank supported in the work head spindle, in the same manner as they are supported on the milling machine. The operations involved in sharpening a face milling cutter are similar to those of sharpening a shell end mill and include grinding the periphery, face or sides and corners of the blades.

After grinding, the cutter should be carefully checked on the face with a dial indicator. If the cutter has been properly ground, taking light finishing cuts of not more than one-half-a-thousandth per pass assures uniform tooth height.

Angular Cutters

An angular cutter may be considered as made up of a number of plain milling cutters of different diameters. When grinding any cutter with a cup wheel, the clearance angle is determined from the diameter of the cutter. It follows that this method would lead to difficulties when applied to angular cutters because of the variation in the diameter of the cutter along the cutting edge. For this reason, a straight

wheel is generally preferred for sharpening angular cutters.

End Mills

End mills with shanks are supported in the universal work head or in the combination attachment. If of the shell type they must first be mounted on a suitable arbor. In sharpening the end teeth, the work head is generally swiveled horizontally about one-half degree from the zero line so as to grind the teeth slightly low in the center of the mill and thus prevent dragging. The work head is swiveled vertically to obtain the desired clearance.

Formed Cutters

Formed cutters are ground radially on the cutting face with a dish wheel. Various methods are employed for controlling the spacing of the teeth. The method illustrated involves the use of a master form as a guide for the tooth rest. The master form is milled with the same number of teeth as the cutter and its accuracy, therefore, determines the accuracy of the cutter after grinding.

Where a master form or an index center is not available, the cutter is revolved until the face of a tooth just touches the cutting face of the grinding wheel. Previously, the wheel face and the center of the radial tooth cutter have been brought into the same vertical plane. The tooth rest is then adjusted against the back of the tooth to be ground.

Hobs

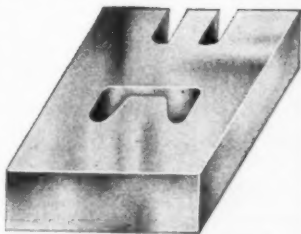
Like formed cutters, the teeth of hobs are made with uniform relief and are sharpened by grinding radially on the faces of the teeth, using the side of a dish wheel. The most important precaution to be observed in setting up for this operation is to line up the cutting face of the wheel with the center of the hob. Also, after each cut, the hob should be revolved toward the wheel for taking additional cuts and not adjusted to the wheel by means of the cross screw.

Chucking Reamers

There appears to be no standard method of sharpening reamers. In the case of machine or chucking reamers of the solid type, the size obviously is lost as soon as the periphery is touched

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with a grinding wheel. Inasmuch as most of the cutting is done by the entering corners of the blades, it is common practice to sharpen such reamers by simply grinding the lead or front bevel, usually at an angle of 45°.

When the straight cutting edges become dull to the point of requiring sharpening, the reamer is ground cylindrically to the next smaller size. The cutting edges are then backed off, leaving a land from a few thousandths to about 1/32" wide, depending upon the material being reamed and the size of the reamer. The reamer will be found to cut better if it is left .001" to .002" smaller at the back end than at the front.

For reamers used on steel, best results are generally obtained with a land from .005" to .008" wide. For cast iron, a slightly wider land, about 1/64", may be used. For non-ferrous metals like brass and soft bronze, the land should be reduced to a "white line," no more than about .002" wide.

Hand Reamers

Except in the smaller sizes, the ma-

jority of hand reamers in use today are of the expansion or adjustable type. The usual procedure in sharpening such reamers is to set them up oversize a sufficient amount, grind cylindrically to the exact desired size and then back off the teeth so as to leave practically a sharp cutting edge, the land being no more than a few thousandths of an inch wide. A few light strokes along the cutting edges with an oilstone will remove any slight burr produced in grinding.

Taper Reamers

Taper reamers must be ground with great care in order to maintain the taper and the diameter absolutely correct. In the machine set-up illustrated, the tooth rest is fastened to the wheel head to insure parallel and straight teeth. The swivel table has been adjusted to the required taper per foot, as indicated on the graduated scale at the end of the table.

The proper cutting clearance will depend on the material to be cut and the size of the reamer.

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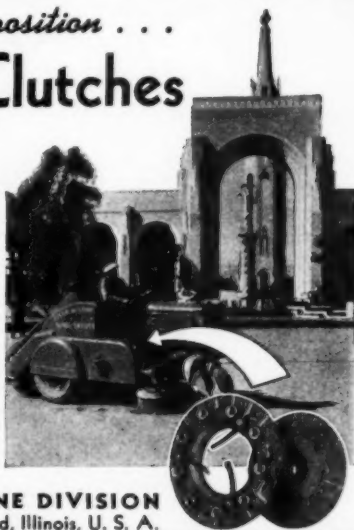
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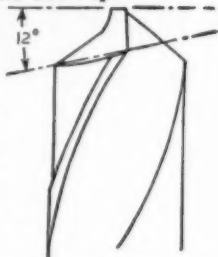


Fig. 4—Lip Clearance.

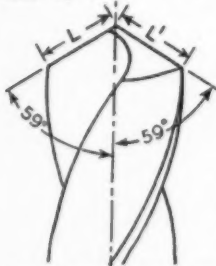


Fig. 5—Both lips must be at same lip angle and of equal length. (L — L').

proper sharpening, or point grinding as it is sometimes called. Excessive drilling costs and in perfect holes can in most cases be traced directly to improper grinding of the point.

Machine grinding is recommended as the more accurate method of sharpening drills. When properly machine ground, a drill will generally cut faster, last longer and produce more accurate holes than if ground by hand. Particularly, drills larger than $\frac{3}{8}$ " should be machine ground.

In the sharpening of drills, the fol-

lowing precautions should be observed:

1. The lip clearance or relief behind the cutting edges should be sufficient for the drill to cut freely, yet not enough to weaken the cutting edges.

If the lip clearance is insufficient, the drill will cut hard, heat excessively and may ultimately "split up the center." If the lip clearance is too great, the cutting edges will tend to chip and break down.

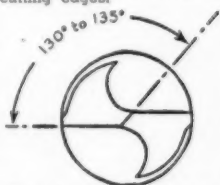


Fig. 6 — Lips properly ground but web requires thinning.

- A lip clearance of 12° to 15° at the periphery of the drill (figure 4), increasing constantly toward the center, is considered standard for the average class of work. When this angle is correct, the chisel point or web intersection will be at an angle of 130° to 135° to the cutting edge (figure 6).
2. The two cutting lips must be inclined at the same angle with the axis of the drill (figure 5) and must be of equal length. If both lips are not ground at the same angle, the drill is subject to early failure as the lip having the larger angle is doing all the work; also the hole will be larger than the drill. If the lips are not exactly the same length, the point of the drill will, of necessity, be off-center and the drilled hole will be oversize.

For general purpose work an included angle of 118° (commercial standard) has been found most satisfactory. For soft cast iron, a somewhat more acute angle, about 90° , will give best results. For brass, the standard angle of 118° may be used but the face of the cutting lips should be ground slightly flat.



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VENTILATED MOTOR

3. After grinding the cutting edges, it may be necessary to thin the point or web (figure 7). If the width of the point is too great, excessive pressure will be required to start the drill and it will tend to rub rather than cut. On the

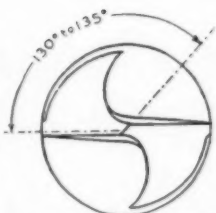


Fig. 7 — Web after point thinning.

other hand, if the point is too thin, there is a tendency for the web to split. Proper pointing diminishes the power required to feed the drill, enabling it to cut more freely.

Point thinning is especially necessary when the drill is worn down to a considerable extent inasmuch as the thickness of the web increases as the shank is approached. Care should be taken not to carry the ground portion too far up the flute, and to maintain the exact center of the drill as otherwise it will cut oversize.

Procedure in Sharpening a Drill

1. Grind the two cutting lips so that they have the same length, the same and correct angle with the axis of the drill and the correct clearance behind the cutting edges.
2. Thin the point of the drill, if necessary, by grinding a short groove on each side of the web. The pointing may be done offhand on a round faced wheel or on a special drill point thinning machine which accurately controls the thickness of the web and automatically centers the point to insure the drill cutting true. Broken or otherwise ruined drills can be reclaimed by cutting off the damaged section with a thin resinoid bonded cut-off wheel, and then grinding the cutting lips as in sharpening.

Grinding Wheels Recommended

Offhand Sharpening (Point Grinding):

- Large drills 36-P regular aluminum oxide abrasive, vitrified bond
- Small drills 60-N regular aluminum oxide abrasive, vitrified bond

Machine Sharpening:

- Large drills 46-L regular aluminum oxide abrasive, vitrified bond
- Small drills 60-K regular aluminum oxide abrasive, vitrified bond

Point Thinning:

- 60-N regular aluminum oxide abrasive, vitrified bond

Cutting-Off:

- 60-P regular aluminum oxide abrasive, resinoid bond

Taps

A tap used after it becomes dull works under a great strain and is apt to chip or break, cut oversize, or produce rough and poor quality of thread. The remedy is to resharpen.

The chamfer becomes dull first, and as a rule it is necessary to grind only this portion of the tap. When grinding offhand, the operator should hold the tap lightly but firmly against the face of the wheel and keep turning it slightly so that a little more will be ground off the back of the teeth to produce the necessary eccentric clearance or relief.

The amount of relief will vary with the length of the chamfer. Five degrees is ample for ordinary plug taps. Bottoming taps, which have a very short chamfer and steep taper, should be ground with correspondingly more relief in order to cut freely. For tapping brass, the chamfer is often ground flat instead of with an eccentric curve, to insure sufficient relief.

If the edges of the teeth become dull or nicked, it is necessary to grind in the flute. This may be done either offhand by passing it under a grinding wheel having the face rounded to conform to the radius of the flute, or it may be done on a tool and cutter machine, grinding back until the cutting faces of the teeth are sharp. In either case, the grinding pressure must be very light and the grinding wheel free and cool cutting to avoid drawing the temper and ruining the tap.

Considerable skill is required to sharpen a tap properly by offhand grinding and the results are usually uncertain. Special machines are available for sharpening taps accurately, insuring a uniform chamfer and the correct, uniform eccentric relief.

Grinding Wheels Recommended

Grinding Chamfer and top

- relief 60-J regular aluminum oxide abrasive, vitrified bond
- (small taps 60-R regular aluminum oxide abrasive, rubber bond)

Fluting

- (large taps .. 46-L special aluminum oxide abrasive, vitrified bond)

Squaring ends

- 60-M regular aluminum oxide abrasive, vitrified bond

Cutting-off

- 60-P regular aluminum oxide abrasive, resinoid bond

(To be Continued)

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use!*

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THE NOPAK patented, flat-disc principle results in highly simplified design, rugged construction, no wearing parts! The flat bronze disc is ground and lapped to make a perfect seal with the seat. This exclusive NOPAK feature continues the uniform "lapping-in" process while the valve is in operation. The result... absolutely leakproof sealing surfaces that actually improve with use!

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Entirely DIFFERENT
Completely AIR CONTROLLED



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The Haskins Type "C" Tapper—built in three capacities and available in single and two-spindle units—appropriately commemorates the Twentieth Anniversary of R. G. Haskins Company. Bulletin No. T-2 will give you all the facts about this history-making new machine. Write for it now. R. G. Haskins Company, 623 S. California Ave., Chicago.



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YOUR SMARTEST INVESTMENT TODAY—BETTER MACHINE TOOLS

PER CENT OF THREAD CHART

(Reproduced by courtesy of R. G. Haskins Co.,
623 S. California Ave., Chicago)

This chart has been prepared to give more detailed information on percentages of threads that can be obtained using certain sizes of tap drills. In most cases standard stock drill sizes are shown. Millimeter and decimal drills are shown only where a standard drill can not be furnished.

For each tap size, three (and in some cases four) tap drill sizes are shown so that the per cent of full thread obtainable by the use of any of these drills can be seen at a glance.

A 75 per cent depth of thread yields an ample margin of thread (2—1) and is economical in tapping.

A full depth of thread in a common nut is only about 5 per cent stronger than a 75 per cent depth of thread, yet it requires three times the power to tap.

Formula for obtaining tap drill size:-

$$\frac{\text{Outside diameter}}{\text{diameter}} \div \frac{.074278}{\text{No. of thds. per inch}} = \text{Drill size for 75\% thread}$$

Example: $\frac{1}{8}''$ -20 thread

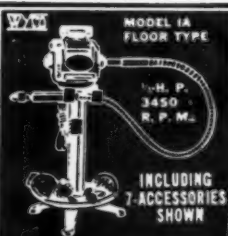
$$\frac{.974278}{20} = .0487139$$

Size of Tap	Threads per Inch			Outside Diam. in Inches	Tap Drill Diam. Size	Inches	% of Full Thread	Size of Tap	Threads per Inch			Outside Diam. in Inches	Tap Drill Diam. Size	Inches	% of Full Thread
	NC	NF	NS						NC	NF	NS				
0	50			.060	1 25mm	.0492	96	5	44		.125	36	1085	82	
					1 20mm	.0472	79					37	1040	71	
					1 16"	.0469	81					38	1015	70	
1		56		.073	53	.0595	56	6	32		.136	34	1110	66	
					54	.055	77					35	1100	69	
1	64			.073	55	.052	90					36	1085	77	
					1 1/2"	.0625	51					37	1040	83	
					53	.0585	86	6		36	.136	33	1110	69	
					54	.0550	88					34	111	75	
1		72		.073	1 1/2"	.0625	56					35	110	78	
					1 55mm	.0610	86	6	40		.136	31	1200	55	
					53	.0595	75					32	1160	66	
2	56			.066	40	.0730	56					33	1130	77	
					50	.0700	80					34	1110	83	
					1 75mm	.0669	74	8	32		.164	28	1405	58	
					51	.0670	82					29	1360	69	
2		64		.066	1 90mm	.0748	55					30	1338	74	
					49	.0730	64					31	1290	84	
					1 80mm	.0709	74	8	36		.164	27	1440	55	
					50	.0700	79					28	1405	65	
3	48			.069	45	.0620	63					29	1360	77	
					46	.0610	86					30	1338	83	
					47	.0785	76	8		40	.164	27	144	62	
					48	.0780	85					28	1405	72	
3		56		.069	44	.0680	56					29	136	86	
					2 15mm	.0846	62	1/2"	24	Stove Bolt	.195	4.2mm	1654	67	
					45	.0820	73					20	161	77	
					46	.0810	77					21	159	81	
4		32		.112	44	.086	64	10	24		.190	21	1590	57	
					45	.082	74					22	1570	61	
					46	.081	76					23	1540	66	
4		36		.112	43	.0890	64					24	1520	70	
					44	.0860	72					25	1495	75	
					45	.0820	83					26	1470	79	
4		40		.112	42	.0935	57					27	1440	85	
					2 30mm	.0905	66	10		28	.190	22	167	71	
					43	.0890	71					23	154	78	
					44	.0890	80					24	152	82	
4		48		.112	41	.0960	59					21	159	72	
					42	.0935	66	10		30	.190	22	157	76	
					2 30mm	.0905	79					23	154	83	
					43	.0890	85					19	1660	59	
5		36		.125	39	.0995	71	10	32		.190	20	1610	70	
					40	.098	75					21	1590	76	
					41	.098	80					22	1570	81	
5		40		.125	37	.1040	65	12	24		.216	14	1820	63	
					38	.1015	72					15	1800	66	
					39	.0995	78					16	1770	72	
					40	.0980	83					17	1730	79	

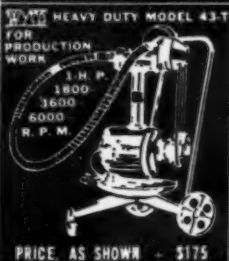
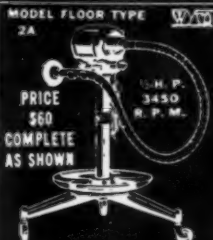
Size of Tap	Threads per Inch	Outside Diam. in Inches	Tap Drill Diam. in Inches	% of Full Thread
12	28	.216	12 13 14 15 16	.1890 58 .1820 73 .1800 77 .1770 84
12	32	.216	1 $\frac{1}{16}$ " 13 14	.1875 70 .185 76 .182 83
14	20	.242	8 10 11	.1960 68 .1935 75 .1910 78
14	24	.242	6 7 8	.204 70 .201 78 .199 79
1 $\frac{1}{8}$ "	18 Stove Bolt	.250	3 4 5.25mm	.213 71 .209 79 .2067 83
1 $\frac{1}{8}$ "	20	.250	5 6 7 8	.2085 87 .2040 71 .2010 75 .1990 76
1 $\frac{1}{8}$ "	24	.250	3 4 5	.2130 86 .2080 76 .2055 82
1 $\frac{1}{8}$ "	28	.250	2 3 3.5mm	.2210 82 .2187 87 .2165 72
1 $\frac{1}{8}$ "	32	.250	5.7mm 2 3 3.5mm	.2244 83 .2210 71 .2187 77 .2165 82
1 $\frac{1}{8}$ "	18	.3125	1 $\frac{1}{16}$ " G F 6.4mm	.2656 85 .2610 71 .2570 77 .2520 84
1 $\frac{1}{8}$ "	20	.3125	I 1 $\frac{1}{16}$ " G	.272 62 .2656 72 .261 79
1 $\frac{1}{8}$ "	24	.3125	J I H	.2770 68 .2720 75 .2680 85
1 $\frac{1}{8}$ "	27	.3125	1 $\frac{1}{8}$ " J I	.2812 65 .2770 74 .2720 84
1 $\frac{1}{8}$ "	32	.3125	7.3mm 7.2mm 1 $\frac{1}{8}$ " J	.2674 62 .2635 71 .2612 77 .277 87
1 $\frac{1}{8}$ "	10	.375	P O 1 $\frac{1}{16}$ " 7.8mm	.3320 64 .3160 72 .3120 77 .3071 83
1 $\frac{1}{8}$ "	20	.375	Q 3 $\frac{1}{16}$ " F	.332 66 .3281 72 .323 80
1 $\frac{1}{8}$ "	24	.375	R 8.5mm Q 2 $\frac{1}{16}$ "	.3390 67 .3348 74 .3320 79 .3281 86
1 $\frac{1}{8}$ "	27	.375	1 $\frac{1}{8}$ " R Q	.3437 65 .3390 75 .3320 89
1 $\frac{1}{8}$ "	14	.4375	1 $\frac{1}{8}$ " U 1 $\frac{1}{16}$ "	.3760 67 .3680 75 .3594 84
1 $\frac{1}{8}$ "	20	.4375	X 1 $\frac{1}{8}$ " W	.3670 62 .3606 72 .3560 79
1 $\frac{1}{8}$ "	24	.4375	Y X 1 $\frac{1}{8}$ "	.4040 62 .3670 74 .3608 86
1 $\frac{1}{8}$ "	27	.4375	1 $\frac{1}{8}$ " Y X	.4062 66 .4040 70 .3670 84
1 $\frac{1}{8}$ "	12	.500	1 $\frac{1}{8}$ " 2	.4375 58 .4219 72 .413 80

Size of Tap	Threads per Inch	Outside Diam. in Inches	Tap Drill Diam. in Inches	% of Full Thread
1 $\frac{1}{2}$ "	13	.500	1 $\frac{1}{8}$ " 1 $\frac{1}{16}$ " 2	.4375 62 .4219 78 .4130 87
1 $\frac{1}{2}$ "	20	.500	11.75mm 1 $\frac{1}{8}$ " 2	.4626 57 .4331 72 .4492 78
1 $\frac{1}{2}$ "	24	.500	11.75mm 1 $\frac{1}{8}$ " 2	.4626 69 .4505 75 .4331 87
1 $\frac{1}{2}$ "	27	.500	1 $\frac{1}{8}$ " 1 $\frac{1}{16}$ " 2	.4687 65 .4640 75 .4626 80
1 $\frac{3}{8}$ "	12	.5625	1 $\frac{1}{8}$ " 1 $\frac{1}{16}$ " 13.0mm	.5000 58 .4844 72 .4844 72
1 $\frac{3}{8}$ "	18	.5625	1 $\frac{1}{8}$ " 1 $\frac{1}{16}$ " 13.0mm	.5156 65 .5118 70 .5000 86
1 $\frac{3}{8}$ "	27	.5625	1 $\frac{1}{8}$ " 1 $\frac{1}{16}$ " 13.0mm	.5312 65 .5265 75 .5230 82
1 $\frac{3}{8}$ "	11	.625	14.0mm 2 $\frac{1}{16}$ " 1 $\frac{1}{8}$ "	.5512 63 .5486 66 .5312 79
1 $\frac{3}{8}$ "	12	.625	1 $\frac{1}{8}$ " 1 $\frac{1}{16}$ " 14.5mm	.5625 58 .5456 72 .5312 87
1 $\frac{3}{8}$ "	18	.625	2 $\frac{1}{16}$ " 14.5mm 1 $\frac{1}{8}$ "	.5781 65 .5706 75 .5625 87
1 $\frac{3}{8}$ "	27	.625	1 $\frac{1}{8}$ " 1 $\frac{1}{16}$ " 14.5mm	.5937 65 .5890 75 .5860 83
1 $\frac{3}{8}$ "	10	.750	17.0mm 2 $\frac{1}{8}$ " 1 $\frac{1}{8}$ "	.6693 62 .6562 72 .6406 84
1 $\frac{3}{8}$ "	12	.750	1 $\frac{1}{8}$ " 1 $\frac{1}{16}$ " 17.5mm	.6875 58 .6718 72 .6562 87
1 $\frac{3}{8}$ "	18	.750	1 $\frac{1}{8}$ " 1 $\frac{1}{16}$ " 17.5mm	.7031 58 .6875 77 .6719 96
1 $\frac{3}{8}$ "	27	.750	2 $\frac{1}{8}$ " 17.5mm 18.0mm	.7187 65 .7140 75 .7086 86
1 $\frac{3}{8}$ "	9	.875	2 $\frac{1}{8}$ " 18.0mm 1 $\frac{1}{8}$ "	.7812 65 .7656 76 .7500 87
1 $\frac{3}{8}$ "	12	.875	1 $\frac{1}{8}$ " 1 $\frac{1}{16}$ " 18.5mm	.8125 58 .7968 72 .7812 87
1 $\frac{3}{8}$ "	14	.875	1 $\frac{1}{8}$ " 2.0mm 1 $\frac{1}{16}$ "	.8125 67 .8071 73 .7968 84
1 $\frac{3}{8}$ "	18	.875	2 $\frac{1}{8}$ " 1 $\frac{1}{8}$ " 18.5mm	.8281 65 .8210 75 .8125 87
1 $\frac{3}{8}$ "	27	.875	2 $\frac{1}{8}$ " 1 $\frac{1}{8}$ " 18.5mm	.8437 65 .8390 75 .8340 85
1"	8	1.000	1 $\frac{1}{8}$ " 1 $\frac{1}{16}$ " 19.0mm	.8906 67 .875 77 .8593 87
1"	12	1.000	1 $\frac{1}{8}$ " 1 $\frac{1}{16}$ " 19.0mm	.9375 58 .9218 72 .9062 87
1"	14	1.000	1 $\frac{1}{8}$ " 1 $\frac{1}{16}$ " 19.0mm	.9375 67 .9304 75 .9218 84
1"	27	1.000	1 $\frac{1}{8}$ " 1 $\frac{1}{16}$ " 19.0mm	.9687 65 .9646 74 .9531 98

(*) Special drill required for this size as the next size larger drill gives too great a percentage of thread.



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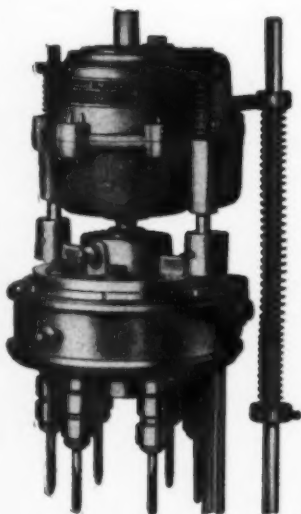
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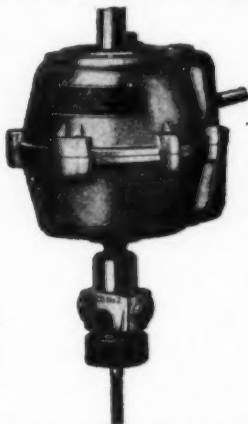
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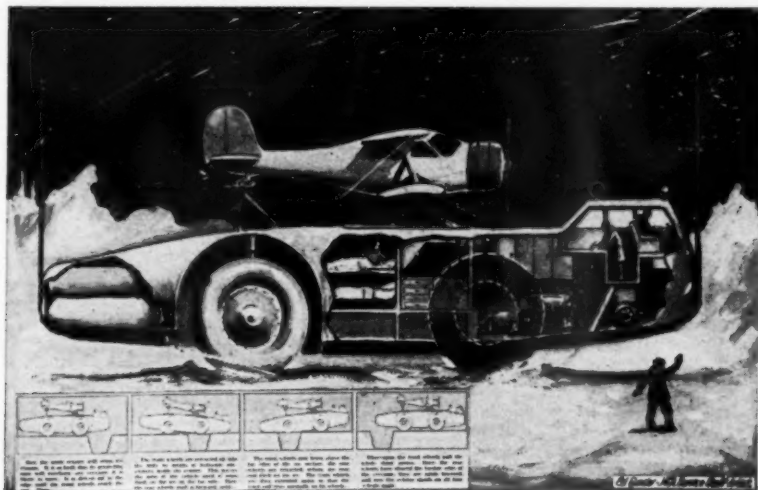
Building The Antarctic Snow Cruiser

Lincoln Puts The Arc In The Antarctic

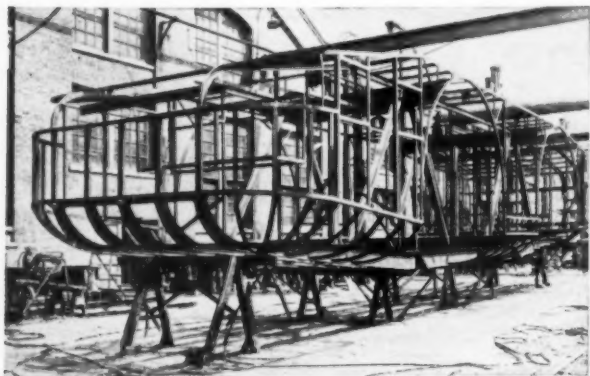
AN ANTARCTIC "Snow Cruiser," main cog in the government's South Polar claim-laying project is approaching completion at the plant of the Pullman Standard Car Mfg. Co., Chicago. Framework of the 4-wheel monster is fully completed and the application of the outer steel skin is proceeding rapidly.

Design and construction of the 55-foot snow traveller was directed and carried out toward one highly desirable end — to obtain the strongest possible structure with least possible weight.

Each two pounds of added weight means a sacrifice of one mile in cruising range. Greatest strength with least weight was obtained by use of high tensile steel structural members, fused into one single homogeneous structure by the modern shielded arc process of electric welding using the latest equipment manufactured for the purpose by The Lincoln Electric Co., Cleveland, Ohio. Lincoln "Shield-Arc 85" welding electrodes, developed particularly for welding high tensile steel, and Lincoln arc welding generators, were used ex-

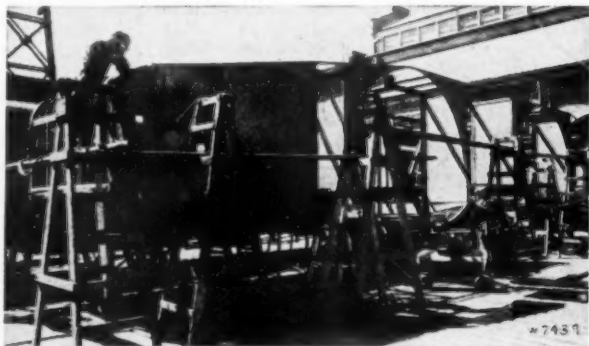


Artist's conception of the Snow Cruiser, 55 ft. long, 15 ft. high, with a cruising range of 5000 miles and a top speed of 30 m.p.h., on 10 ft. diameter tires. The small photo inserts show the proposed method of crossing ice chasms through the use of retracting wheels and individual wheel drive.



The sturdy welded steel skeleton utilizes 16,000 lbs. of high tensile steel.

Modern arc welding assures maximum strength and minimum weight.

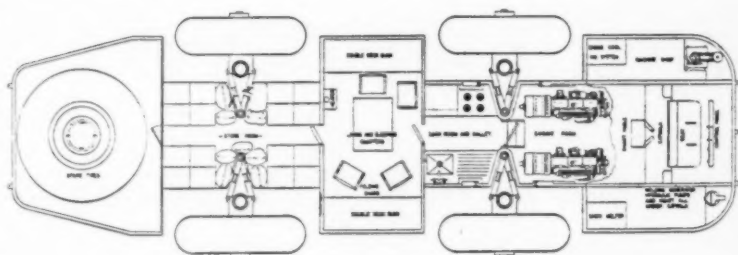


clusively. If conventional riveted construction had been employed, it is estimated that the weight would have been at least 30% greater. Thus, the 16,000-pounds of structural steel would have cut the cruising range materially from the estimated 5000 miles.

Construction of the "Snow Cruiser" by arc welding, consisted of fusing together a great number of structural members, cut, formed, fabricated and fitted to the design. Work began with the laying of the 5 longitudinal strength members which are standard 12-inch I-beams, slit lengthwise of the web,

vee'd to a taper, then arc welded to provide one-piece members which may be seen in the photo. This is a unique construction made possible by welding. From this point, construction became a matter of assembling the structure a part at a time, first tack welding each additional part into the structure until alignment could be checked and then permanently fusing the parts into the whole with full-penetration finishing welds.

Three sizes of Lincoln "Shield-Arc 85" electrodes for high tensile steel were used for the welding. $\frac{1}{8}$ -inch size was



GENERAL LAYOUT OF
SNOW CRUISER

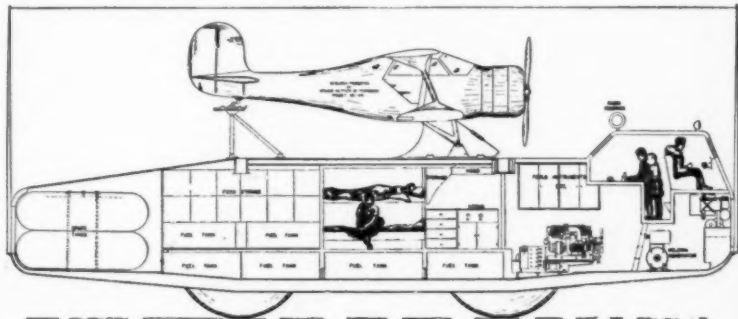
used for tack welding and light gauge work, 5/32-inch for the bottom shell and medium thicknesses, and 3/16-inch for the heavy welding. Approximately 550 pounds of electrode was required for construction.

Utilized so effectively in construction of the "Snow Cruiser," arc welding will also be an extremely important adjunct to the polar vehicle's permanent equipment, for a Lincoln arc welding generator, of 200-ampere capacity, fitted for belt drive, will be permanently installed, together with a kit of Lincoln arc welding electrodes. The welder will be a useful tool for the Cruiser's machine shop where it will be used for all sorts of necessary repairs such as the welding of broken or worn machine or structural parts, the fabrication of miscellaneous devices and equipment. With a carbon electrode the welder can be used to cut metal. Indispensable in many ways,

the welder may be used for charging batteries and for supplying power to raise or lower the wheels. It may also prove a vital aid in case of emergency since it can supply current for lighting or for operating tools, even starting the Diesel engines with which the "Snow Cruiser" is to be equipped.

The "Snow Cruiser" was designed by the staff of the Research Foundation of Armour Institute of Technology, Chicago, as a fundamental research project under the direction of Dr. Thomas C. Poulter, scientific director, who was second in command and senior scientist of the Byrd Antarctic Expedition II.

As unique a self-propelled vehicle as was ever produced by man, the "Snow Cruiser" will carry provisions for one year for a crew of 4 men, will carry a complete scientific laboratory and will make it possible by means of an airplane transported on its top deck,



to explore a strip of territory 600 miles wide. Capable of traversing 15-foot crevasses, propelled by any one or all four of individually driven wheels, the

"Snow Cruiser" unit should be able to map out and explore in one month more territory than all previous expeditions combined.

Glass Fiber Insulation

A DEMONSTRATION of glass fiber insulation for motors is attracting attention at the New York Fair. Sponsored by Owens - Corning Fiberglas Corp., the exhibit is called, "The Electric Motor of Tomorrow."

A completely Fiberglass-insulated motor in a standard five h. p., frame size is shown, delivering, constantly, the same power as a standard cotton-wound 10 h. p., motor opposite.

The exhibit demonstrates that Fiberglass permits a substantial reduction in size and weight of motors. It also demonstrates that motors with such insulation may be operated at higher temperatures.

Further, it is evidence that the rating of many motors using Class A insulation could be increased from 50 to 100 per cent with the aid of glass insulation.

The two motors in the exhibit are hooked up to a dynamometer through a coupling and the load may be alternated readily between one and the other. The gauges show that the small motor, which is some 160 pounds lighter in weight and 45 per cent smaller in volume, will develop the same power as the larger standard motor and without sacrifice of stamina.

The smaller motor weighs 190 pounds as compared to a weight of 354 pounds for the larger motor. Both are 1750 r.



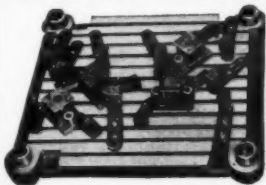
p.m. squirrel cage induction units wound for 3-phase, 60-cycle, 220/440 volts current. The frame size of the Fiberglass motor is No. 254—standard for five h.p.—and frame size of the larger motor is No. 324—standard for 10 h. p.

There is a marked difference in the temperature rise. At full load this is 55° C. in the standard motor, whereas the smaller motor permits a temperature rise to 100° C. at full load.

Because the commonly used types of organic insulation—such as cotton, silk, and paper—rarely permit a rated temperature rise greater than 55° C., insulation of the standard motor probably would burn out soon if the motor were run at the higher temperature of the smaller motor.

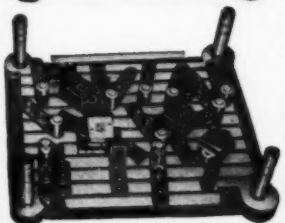
Stator coils of the new motor are

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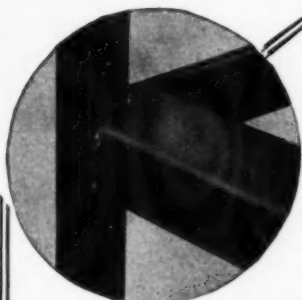


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Fig. 1249
Pat. Applied For



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UNIVERSAL

Engineering Company
Frankenmuth, Mich.

wound with glass-insulated magnet wire and taped with Fiberglas tape. Stator slots are lined with an insulation made of a combination of mica splittings and Fiberglas cloth bonded together. The slot wedges are made of a molded product consisting of laminated Fiberglas cloth and a bonding media. Lead wires are protected with Fiberglas braided sleeveings and tied down with Fiberglas tying cord.

The new insulation has also helped to solve the problem of moisture absorption. In fact, it is asserted that glass is the first practical totally inorganic textile—with characteristics permitting it to be used on standard textile machinery. In the laboratory and in operation it is asserted that these characteristics have proved it to be, in most cases, superior in many ways to other fibrous materials used for electrical insulation.

Fiberglas insulation is being specified for a wide variety of jobs, ranging in size from fractional horsepower motors to the largest of generators—such as will be used in the Grand Coulee Dam.



Tapping As Fast As You Can Drill . .

with the A. M. Sensitive Tapping Machine . . . from the smallest and finest up to $\frac{1}{16}$ " diameter in steel and iron—and up to $\frac{1}{4}$ " in softer materials. A modern unit

that within its capacity, will take all the punishment intense production can inflict.



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OF

THE HAMILTON TOOL CO.
HAMILTON, OHIO



FOR SAFETY AND ECONOMY USE A

National PUMPLESS SAFETY Torch



TOPS IN PERFORMANCE

Compare the many matchless features of National Pumpless Safety Torches with those of ordinary torches. Only in National Torches do you get exclusive and superior construction to insure unequalled Safety, Operating Efficiency and Economy.

Of utmost importance is the complete elimination of the old-fashioned pump, with its hazard of bursting pressure from excess pumping and constant danger from pump leakage. Other outstanding features are self-cleaning orifices, disintegration of composition or lead packing to passages — National uses concave — convex, brass to brass, ground fits, making leakage impossible. National Torches give 100% complete combustion with no carbon-monoxide gas, no soot in the flame and a higher degree of heat (2400° F.) Actually, National Torches are perfect refineries in miniature.

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More Heat

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Convenience of operation is another major feature of National Safety Torches. Their compact design, the elimination of unnecessary parts and consequent reduction in weight, plus the use of "non-tiring" natural grip handles, makes them easy to use in unusual angles.



The scientific design of National Safety Torches permits using them at any angle, with positive assurance of continuous burning with absolute safety.

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"Budgit" Hoists are light weight, low cost electric hoists (prices start at \$119.00) that contain operating conveniences and advantages not found in even the most expensive hoists. Available in 250, 500, 1000, and 2000 pounds lifting capacity with speeds to suit today's tempo. . . . You can put "Budgit" Hoists to work immediately! There is nothing else to buy! . . . You simply hang up, plug in, and Use!

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"Budgit" Hoists are obtainable quickly from a Distributor's stock near you.

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Manning, Maxwell & Moore, Inc.

435 BROADWAY MUSKEGON, MICH.

Makers of all types and sizes of cranes and electric hoists for more than half a century.



N. M. T. B. Opposes War

A FIRM STAND against America's participation in the European war was taken by Wendell E. Whipp, President of the National Machine Tool Builders' Ass'n and President of The Monarch Machine Tool Co., Sidney, Ohio, in an address before the annual convention of the Association in Cleveland.

"I think we should make it clear to the public of the United States," Whipp said, "that although the machine tool re-equipment of the plants and factories of America has an important bearing upon national defense, the machine tool builders of this country are, nevertheless, absolutely opposed to war, and will co-operate to the fullest extent in helping in any possible way to keep this country out of war."

"The net result of war is always a net loss. This applies to the victor and the vanquished alike. No actual prosperity can be gained by deflecting the ingenuity and the energy of mankind to purposes of destruction. Real wealth is created only by the production of goods and services which add to the possessions and the welfare of humanity."

"Humanity cannot build for war and expect to enjoy the rewards of peace. Those who build for war must expect to share the losses inevitably resultant upon war. Any prosperity stimulated by war is a false prosperity, and must be paid for a thousand times over by the loss in life, the loss in resources, and the loss in business activity



throughout the world, which inevitably follows war.

"There is danger that emotionalism and indignation may carry this country headlong into the present war, almost before we are aware of it. This would be a supreme disaster."

"War today in its very nature requires regimentation. And regimentation involves the loss of the very freedom which constitutes the basic element of democracy. Instead of losing democracy at home to fight for it abroad, it would

seem far more important to remain at peace and assure democracy at home."

"It seems to me that the major job which we have before us today is that of reconditioning our internal economic and business structure. We must get the businesses of the United States back once more upon a full-time production basis. We must somehow manage to re-employ all of the people who are actually employable, but who are still at this moment out of work. We must put the plants and factories of this country to work turning out more of the actual physical products which really constitute wealth. We must build up the resources of this country, and develop an internal strength and stability which will enable us to meet any contingencies which the future may bring forth."

"The social and economic function of the machine tool industry is to raise the standard of living by helping to cut the cost and improve the quality of the

devices and conveniences by and with which people live. As long as we keep this premise clearly before us, we can steer a safe course through the troubled times that lie ahead."

In discussing the remarkable increase in business received by the machine tool industry in September, Whipp pointed out that a very large share of the increase came from domestic manufacturers, most of them in fields unrelated to war preparedness.

"While war may have supplied the occasion for the current great upswing in machine tool orders in this country," Whipp said, "obsolescence and the need for modernization constitute the real reasons."

Tool Ass'n Passes Resolutions

The nation's machine tool builders went on record as "opposed to warfare and in favor of the maintenance of honorable peace in the United States," in a resolution passed at a convention session of the National Machine Tool Builders' Ass'n held in Cleveland, October 3rd. The resolution in full states:

WHEREAS: The members of the Na-

tional Machine Tool Builders' Ass'n hold firmly to their conviction that real wealth is created only by the production of those goods and services which add to the possessions and the welfare of all the people;

WHEREAS: War is destructive to those benefits to humanity;

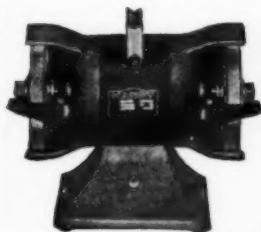
THEREFORE, BE IT RESOLVED: That we, the members of the National Machine Tool Builders' Ass'n, assembled in convention at Cleveland, declare ourselves opposed to warfare, and in favor of the maintenance of honorable peace in the United States.

Officers of the Association elected for the coming year are:

Pres., John E. Lovely, Vice Pres., Jones & Lamson Machine Co., Springfield, Vt.; 1st Vice Pres., Frederick V. Geier, Pres., The Cincinnati Milling Machine Co., Oakley, Cincinnati, O.; 2nd Vice Pres., Clifford S. Stilwell, Executive Vice President, The Warner & Swasey Co., Cleveland; Treas., Wendell E. Whipp, Pres., The Monarch Machine Tool Co., Sidney, O.; Sec'y, Mrs. Frida F. Selbert; General Manager, Tell Berna.



New Officials at the helm of the National Machine Tool Builders Association—(Center) President John E. Lovely (Vice President, Jones & Lamson Machine Co., Springfield, Vt. (Left) First Vice President, Frederick V. Geier, (President, The Cincinnati Milling Machine Co., Oakley, Cincinnati, Ohio) (Right) Second Vice President, Clifford S. Stilwell (Executive Vice President, The Warner & Swasey Co., Cleveland, Ohio).



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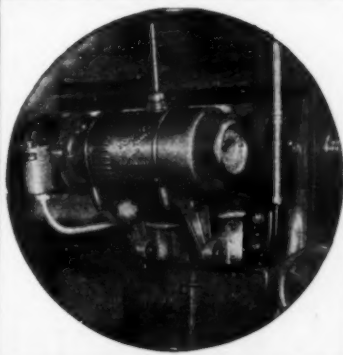
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4-Speed Units—\$10.00 additional.

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- Gears are hardened and run in oil.
- Pulley Shafts— $1\frac{1}{4}$ " Dia. fitted with ball bearings and Garlock Oil-seal Klosures.
- Belt adjustments provided, also tapped holes for fastening Belt Guards.

Please tell us the make and size of machines you would like to motorize. We will then send you our recommendations.

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3401 CONNER AVE. :—: DETROIT, MICHIGAN

WHAT'S NEW *in the industry*



Landis Threading Innovations

It is customary to look to Landis for threading developments—and the latest of these are especially interesting.

The illustration shows an installation of automatic forming and threading machines. Introduced at the 1927 Show, these units have been refined and improved in many details.

Covering a diametrical range from $3/16"$ to $3/4"$ inclusive, the standard capacity permits handling bolts from 1" to 6" long. A simple accessory increases the length capacity to $7\frac{1}{2}"$. Still another accessory permits the handling of studs and similar work.

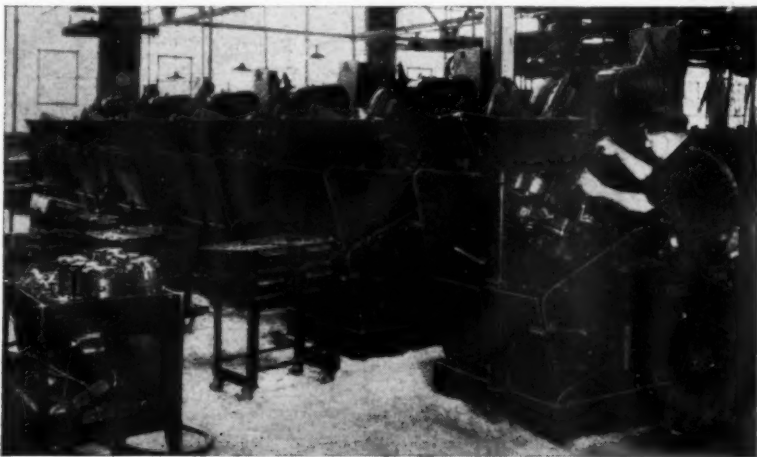
Typical of its ordinary performance is the pointing and threading of $3/8"$ x

$2\frac{1}{2}"$ hex head cap screws at the rate of 20 per minute.

The new four-spindle semi-automatic threading machine is a versatile performer. The unit shown covers a capacity range of from $1/4"$ to $3/8"$ inclusive. It is so flexible in operation that it may be used on almost any kind of threading job within its diametrical capacity.

The makers stress the fact that its production possibilities are limited only by the capabilities of the operator. For example, threading more than 1900 hollow head set screws per hour.

On this kind of a job, the operator loads the small driving mandrels which hold the screws during the threading operations. These mandrels are locat-



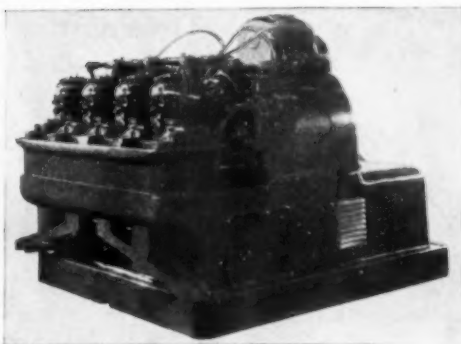
ed on a four-position indexing fixture which carries the screws to the threading position. The die head advances, completes the threading operation and returns to its original position, after which the indexing fixture rotates to bring a new piece of work into the threading position. During this next threading operation the threaded screw is automatically ejected from its mandrel and the operator reloads at the fourth position.

The four-spindle unit is equally adaptable for long rods, bolts, cap screws, etc. It is recommended especially for bolt and screw plants, or for the manufacture of any small threaded parts which must be handled on a high production basis.

Where quantities of chasers must be ground on a production basis, the new type No. 1 Landis chaser grinder is recommended. It has numerous refinements and improvements.

The Lanhydro closeup shows a unit employed on automotive parts, for hollow milling or "turning" operations.

These Lanhydro threading machines are automatic in operation. The work grips open and close automatically, carriage movement is automatic—opening



and closing of the die heads is effected by an hydraulically controlled cycle.

A late Landis development is a double head threading machine, hydraulically operated. Units of this type are being used successfully by makers of railroad accessories and conduit.

Typical of the units used by many leading manufacturers of oil well tubular goods for the production threading of casing, tubing and drill pipe is the big 13 $\frac{3}{8}$ " receding chaser pipe machine. The rated capacity is 8 $\frac{1}{2}$ " to 13 $\frac{3}{8}$ " inclusive, although by the use of auxiliary chaser holders, the range can be extended down to 4 $\frac{1}{2}$ ".

A difficult threading operation recently performed on a Landmaco 2" threading machine involved cutting a continuous thread on bars five feet long. There were afterwards cut into very short lengths to be used in adjustable open end wrenches. A modified Buttress thread form was employed, and since an especially good finish was required, special chasers were used which performed a roughing and finishing cut at one pass.

Bulletins on any items in the broad Landis line may be obtained by addressing the Landis Machine Co., Waynesboro, Pa.

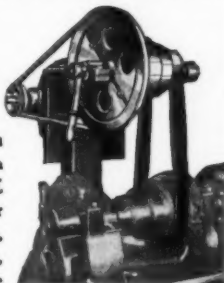


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When you purchase a **STEEGE Drive** for your lathe, shaper, miller, etc., you're protected by our broad 5-year guarantee.

STEEGE Drives are easily installed—prices \$35.00 up—sent on 30 days' approval. *Let us send catalog.*

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Available in Noiseless Spinning and Vibrating Hammer types—also Vertical and Horizontal Multiple Spindle Spinning Machines.



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BRIDGEPORT, CONN.

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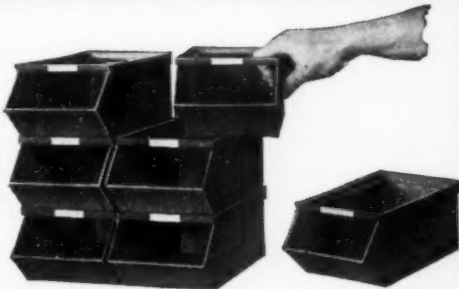
because they stack compactly to form units of exactly the right shape and capacity;

TIME

by keeping parts instantly accessible—by eliminating waste hand motions;

LABOR

by making order-filling or assembly work faster, easier, more efficient.



See how you can save all three with patented **STACKBINS**—write to Stackbin Corp., 55 Troy St., Providence, R. I., for complete information.

STACKBINS

"STACKED AND STILL ACCESSIBLE"

"Microlite" Protective Coating

The Michigan Chrome Co., 6340 East Jefferson Ave., Detroit, offers a new protective coating material to be used for insulating plating racks. It is asserted that this coating, known as "Microlite," can be applied faster and will air dry faster than the usual plating rack protective coatings. Dipping speed is approximately five times faster than that of other coatings. Under average

drying conditions, one coat can be applied each hour. The seven coats recommended to prepare the racks for plating use can be applied in one day and the racks can be used the following morning.

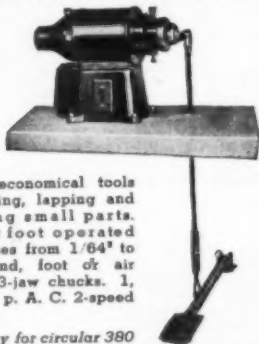
This material has been developed as an all-purpose protective material for plating racks, used in any solution or acid or in any process. It is not affected through the complete cycle of plating. It is effective in all types of cleaning operations. It contains no pigments but is perfectly clear in appearance both before and after it is applied.

It is of a low viscosity which permits the application of extremely thin—yet effective—coatings. No thinner is required except for an occasional surface spraying when racks are being dipped. It assures smooth, uniform coatings, and there is practically no dripping of the material after the racks have been dipped. Webbing or pocketing between contact points is reduced to a minimum.

The material can be applied either by hand or machine dipping. It is applied directly on the metal surface of the rack, with no treatment necessary other than cleaning the surface to be coated. No tape or any special treatment is required. If a rack should become damaged in process, it is only necessary to touch up the damaged section—the patch becoming an integral part of the entire coating.

SCHAUER Speed Lathes

Timesavers for Your Plant



Speedy, economical tools for finishing, lapping and polishing small parts. Hand or foot operated collet, sizes from 1/64" to 1/4". Hand, foot or air operated 3-jaw chucks. 1, 1/2 or 3/4 h. p. A. C. 2-speed motor.

Send today for circular 380

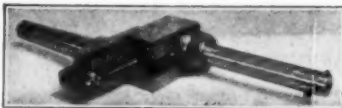
SCHAUER MACHINE CO.
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"CHAMPION" Steel Racks

Save time, steps and money by keeping bar stock, shafting and pipe out of the way and off the floor.

Write for full details.

The Western Tool & Mfg. Co.
Springfield, Ohio



MODERNIZE present equipment with a **RUSSELL BORING BAR**. Bores 9/16" to 12" dia. with boring axis parallel to shank axis. One compact tool, with micrometer adjustment.

RUSSELL BORING BAR CO.
MIDDLETOWN, OHIO

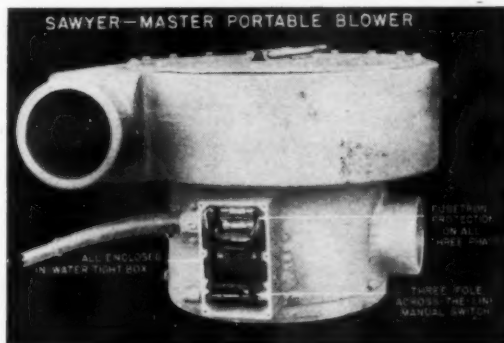
Sawyer Perfects Compact Blower Unit

A distinct innovation in blower construction is presented by the new Sawyer Master Pressure Blower which was designed primarily for exhausting toxic fumes from welding operations where space is at a premium and an advantage lies in exhausting through a hose rather than directly through the machine. It is capable of moving a large quantity of air through hose up to 75 feet in length.

The specially built motor is entirely enclosed and is placed in the intake air housing in such a way that the entire volume of air delivered by the blower passes completely around the motor, effectively air cooling it.

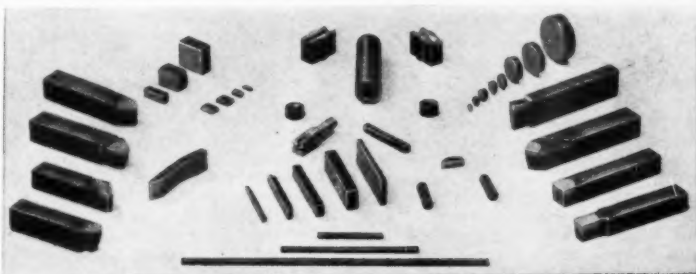
The elimination of brushes, commu-

tators, gears and centrifugal switches simplifies the construction and reduces size, weight and maintenance expense.



It is claimed that the Sawyer motor delivers a given horsepower with about half the weight of other motors, and that the power pull out is twice the rated capacity.

The blower is furnished with one,



Announcing — a new Carbide in the cutting field —

A cemented tungsten carbide produced by our HOT PRESSED method increases density and durability.

Convince yourself — Test it for production efficiency and economy against other cutting tools — Prices are also economical — *Write for quotations.*

LATHE & BORING TOOLS — BLANKS & NIBS — WEARING SURFACES

CIRCLE TIP TOOL CORPORATION

44 Hedden Place

:-:

East Orange, New Jersey

Precision Collet Chuck

HEAVY FEEDS can't loosen the Erickson 8-POINT collapsible collet grip. Collapses accurately 1/32", maintaining 8-point grip.

7 BIG POINTS

Pat. Pending

8-Point grip
High accuracy
Faster operation
Less drill breakage
Parts interchangeable
Unusual range per collet
Holds on flutes—Broken drills can be used.

Folder Gives Full Details

ERICKSON STEEL CO.

East 80th & Bessemer,
Cleveland, Ohio

two, or four inlet ports, with inside diameters dimensioned according to the capacity of the blower. Inlet ports are screened to prevent dust and dirt from affecting the impeller.

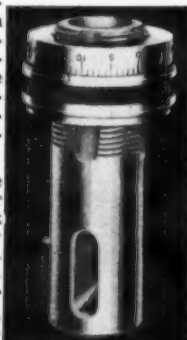
Compactness is one of the main advantages. Height is 15" and the entire unit can be passed through an opening 21" in diameter. The motor is rated at one h.p., and operates on 220 volt, 3-phase, 60 cycle current at 3600 r.p.m. Under these conditions the capacity of the Sawyer Blower is said to be exceptionally high in proportion to size and power consumption. Tests show, it is asserted, that 680 cubic feet of air can be handled per minute, with static pressure 3½" or higher, at 68° F. Air velocity is approximately a mile a minute.

Further information will be supplied by Sawyer Electrical Mfg. Co., 5715 E. Leneve Ave., Los Angeles, Cal., manufacturers of aerial grinders and other tools powered with special motors.

Speedier Set-Ups With the Micro-Nut

An interesting device known as an Adjustable Micro-Nut has been developed recently by the engineering department of The Gairing Tool Co., Detroit, Mich.

Adaptable for use on either single or multiple spindles, it is claimed that they quickly and accurately set end-cutting tools to their correct length and, in the case of multiple spindles, in proper relation to each other.



Graduated to permit adjustments ranging from .001 to .020", this is accomplished by an adjustable sleeve feature of the nut that works independently of the screw. The relative position of the cutting tool can be extended or retracted and measured adjustments can be made without guessing or interfering with the entire tool set-up.

In cases where the cutting tool must be extended or retracted more than .020", the set required is easily and quickly made by loosening the Allen screw in the Micro-Nut and turning the nut on the screw threads at an approximate estimate of the extension or retraction required (one complete turn of the whole unit equals .083".—Allen screw stations at quarter turns). Then the Allen screw is tightened and the final precision adjustment is made on the graduated Micro-Nut.

The manufacturer claims that these Adjustable Micro-Nuts, when used in connection with any standard adapter assembly or with tool holders and boring bars, will give the operator everything he has ever had before plus a speed and precision accuracy that save time and work spoilage. They reduce the attainment of close tolerances to an automatic method of simple arithmetic.

Rust Prevention

Rust is the result of oxidation (at normal temperatures) in the presence of moisture. If the surface of the metal is absolutely dry there can be little reaction between oxygen and iron or steel. However, in the course of production of such materials they often come in contact with moisture in one form or another; this moisture, of course should be completely removed from the steel before slushing oil is applied if freedom from rust formation is to be assured.

The most important consideration regarding rust prevention is that as long as the metal can be kept warmer than the surrounding air, moisture will not condense thereon from the atmosphere. The next step after completely drying the surface is to treat the steel with a suitable rust preventative which will completely coat the surface, and prevent any possibility of wetting by moisture while being held in storage.

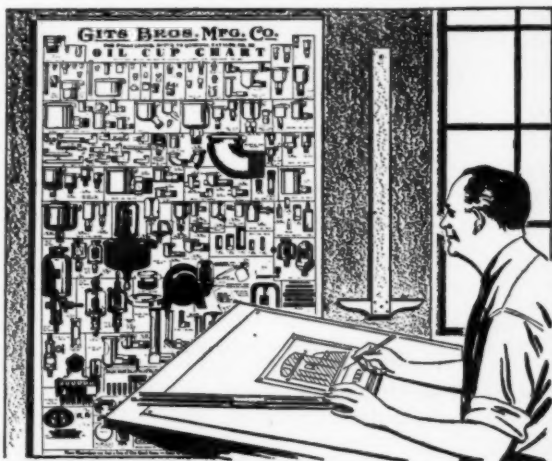
The ideal protective film of petroleum base (slushing oil) should be easy to apply; give maximum protection against rusting; be easy to remove when protection is no longer required.

Slushing oils

as generally used will fall into two broad classifications: Straight mineral oils and special rustproofing oils of petroleum base.

Special rustproofing compounds are particularly useful where storage conditions are poor and added protection is needed.

Detailed information on rust prevention, is contained in Sept. '39 copy of Lubrication published by the Texas Co., 135 E. 42nd St., New York.



Your Engineering Department needs this Chart Now!

After completing your designing, and your particular application calls for oilers, then is the time to refer to GITS OILER CHART. At a glance you may find just the right oiler to suit that particular application, or you may send in your drawings and our engineers will gladly help solve your problems. GITS has an oiler for all applications. Backed by 30 years experience manufacturing oilcups exclusively.

A full size 24x36 chart will be mailed to your engineering department upon request.

GITS BROS. MFG. CO.

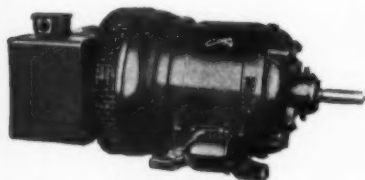
28 years of oil cup experience

1860 South Kilbourn Ave.

Chicago, Ill.

Allis Introduces New Adjustable Speed Motors

The Louis Allis Co. of Milwaukee asserts that its new Ajusto-Spede motor incorporates an entirely new principle in alternating current adjustable speed motors, as well as many new advantages and economies heretofore not available.



The motor is a combination of an eddy current clutch and a standard constant speed a.c. squirrel cage motor.

There is no mechanical contact between the driving and driven members of the unit.

The speed and torque variations are obtained by controlling the magnetic excitation of the clutch, thereby obtaining any desired slip.

The makers list the following functions performed by this unit without jar, shock or stress on any of the driven parts.

Gradual or quick acceleration of load, rapid intermittent starting and disconnecting load, absorbing of torsional impulses and vibrations—

Among the special features claimed are:—an unusually wide range of speed variations from zero to full speed at full load torque; continuous operation at low speeds without overheating; and remote control available as standard at slight extra cost.

Copy of a new eight page Bulletin No. 611 will be sent on request by The Louis Allis Co., Milwaukee, Wis.

Multi-Story or Single Story?

A graphic comparison of relative building and operating costs in single story and multi-story industrial buildings, and a discussion of their relative advantages and disadvantages, is presented by The Austin Co., in the fifth edition of its booklet, "Your New Plant—Multi-story or Single Story—Which?"

In the face of widespread interest in air conditioning and other controls for industrial plants, the new edition devotes special consideration to the adaptability of single story and multi-story plants to such installations.

Copies of the study can be obtained from The Austin Co., Cleveland, Ohio, or from any of its 13 district offices.



For Machine and Tool Work & Quick Set-Ups

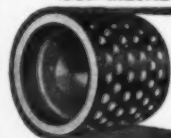
The only 3-way reading precision indicator. Accurate in either direction. Feeler mounted in centered cone bearings. .014 reading. New improvements.

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Solid and Split

Sizes 2" to 72" Dia.

**Shut Off Expense Caused by Slippage
You Save Money on Every Installation**

NEW LOW PRICED PRODUCTION LINE

SEE PART LIST PRICES BELOW

Dia.	Face	Price
2"	"x2"	\$1.25
2 1/2"	"x2 1/2"	1.45
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3 1/2"	"x3 1/2"	2.25

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Dia.	Face	Price
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4 1/2"	"x4 1/2"	3.35
5"	"x5"	3.95
5 1/2"	"x5 1/2"	4.75

**Increase
your
Production**

Try one at our risk on your worst drive. You be the Judge.

VACUUM CUP METAL PULLEY CO., INC.
12536 Grand River Ave., Detroit, Mich.

Michigan Tool Announces New Gear Lappers

A completely new line of gear lappers, of the two-lap type, employing the crossed-axis method of operating, original with Michigan gear finishers, is announced by Michigan Tool Co., Detroit.

Automatic in operation, the new machines are available in vertical and horizontal models, the latter being illustrated.

The new machines are provided with electrical controls which permit adjustment of the lapping cycle to meet virtually every variation desired. The new line is designed for high production lapping of moderate and small sized gears ($\frac{1}{2}$ to 8" diameter) and is not restricted as to pitch of gears which may be lapped. Machines are also available in 1 to 12" capacity.

Fundamentally, the new machines employ a relatively low surface speed, with high speed of reciprocation of the laps across the gear faces. By means of a single adjustment it is possible to vary this speed from 90 to 300 reciprocations per minute. A change-gear box is provided for the lap spindle, through which the latter may be operated at speeds ranging from 52 to 283 r.p.m. A third adjustment permits selection of desired reciprocating stroke length.

Two timers are provided to permit individual adjustment of desired lapping time on either side of the teeth, the range available being from two



seconds to 20 minutes in either direction.

In operation, the two laps are mounted on the lap spindles, while the gear to be lapped is mounted between live centers between the laps. The lap spindle heads are adjusted to provide the correct amount of crossed-axis (Lap angle minus gear angle).

Individual motor drives are used for driving lap spindles and for reciprocating the work. The former drives one lap spindle, the lap driving the work, and the work in turn driving



DON'T THROW AWAY VALUABLE CARBIDE TIPPED TOOLS \$\$\$

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Tips Remounted—Shanks Retipped—Round Tools Expanded to Size—Grinding—Lapping.

Carbide Tool Salvage Division

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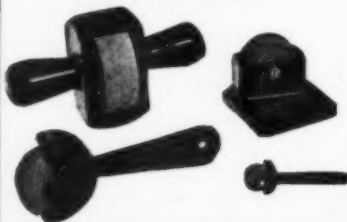
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Ask for a 10 DAYS FREE TRIAL. Our 1 HP 2 SPEED BLOWER and suction CLEANER (illustrated) will solve the most difficult cleaning problems.

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ABRASIVE WHEEL DRESSERS



KEEP GRINDING WHEELS SHARP AT LOW COST. SPECIAL DRESSER FOR SURFACE GRINDER GIVES HEAVIER CUT WITHOUT BURNING.

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M & S DRESSER

377 CORNWALL ST.,
HARTFORD, CONN.

the second lap, whose spindle is equipped with an hydraulic brake. The second motor through an eccentric drive, rapidly oscillates the work carrying head in line with the axis of the gear.

With the timers set, starting the machine results in (1) revolving laps and spindle in one direction for the first pre-selected period, and (2) automatic reversal and lapping of the gear in the opposite direction for the second pre-selected period. The machine then stops automatically. One lap spindle is thereupon retracted by means of a hand-lever, permitting removal of the lapped gear.

The next gear is then loaded in mesh with the second lap, and the retracted lap again brought into lapping position by means of the control handle. The arrangement insures that laps and gear will always mesh properly, preventing damage to laps.

Lapping compound is supplied through a special pump. Lubrication of vital parts of the machine is through a manifold oiler, eliminating the necessity of individually oiling the various parts.

At Last!

**A Positive,
Roll Grip
Keyless
Drill Chuck...**

Check these advantages:

- 1—Drills will not slip.
- 2—100% keyless.
- 3—The heavier the load, the tighter it grips.
- 4—Ends damaged drill shanks.
- 5—Yes! The tapered shanks are tempered.
- 6—Slight twist of the wrist releases drill.
- 7—Scientifically designed, ruggedly constructed.
- 8—Runs true—and remains so.
- 9—Unconditional one-year guarantee (barring abuse)

Send for detailed folder.

Motor Tool Mfg. Co.
12280 Turner Ave.,



Detroit, Mich.

Peace Products Show Greater Increase

"The great bulk of the increase in domestic machine tool buying which has occurred during the last month has originated with companies engaged in the manufacture of peace-time products of the country." Charles J. Stilwell, Executive Vice President of Warner & Swasey Co., issued this statement recently after reviewing current orders placed with the company.

Contrary to widespread belief, the present activity in the machine tool field represents a response to the upward trend in general business since last Spring, plus the added stimulus provided by the rush to increase inventories incidental to expectations of a war boom.

"A review of current orders now on our books," said Mr. Stilwell, "shows that practically every type of industry requiring machine tools—and this includes by far the major share of all manufacturing enterprises of the country—is actively in the market for machine tools.

"While it is true that orders from airplane manufacturers and other indus-

tries more or less closely identified with national defense have been substantial, the great bulk of the increase has been with manufacturers of peace-time products.

"In the case of our own Company which I believe is typical, a surprising upturn has materialized from practically all of the domestic machine tool using industries we serve."

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**Speed
Inspection
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Quality**

Dial Indicators are too frequently considered, only from the standpoint of checking dimensions of close limits of thousandths or tenths of thousandths of an inch; yet, their biggest value is in simply controlling production to the size specified. Actual savings in production, material, and assembly are repeatedly making money for the user. Investigate and send for Catalog No. 39.

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Modern Develops New Feed Handle

The Modern Collet & Machine Co., 401 Salliotte St., Ecorse, Mich., has recently introduced a new type of feed handle for use on Gridley automatic screw machines.

The new feed handle is so adjusted that, in the meshing of the gears and feed box, the gears will positively stay meshed. This eliminates rattle and unnecessary wear on the feed box gears as well as on the feed box speed change holes.

In designing this feed handle, provisions were made for durability as well as simplification, to the end of reducing repair costs. With the old type handle, when breakage or wear of any part occurred, it was necessary to replace almost the entire handle. With the Modern Collet feed handle, however, the parts are so constructed and arranged that any individual part may be replaced quickly and easily.



Machine Guns of Industry

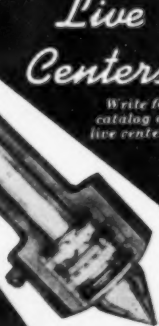
The Van Dorn Electric Tool Co., Towson, Md., has just released to the trade a handbook of portable electric hammers. This comprehensive and profusely illustrated work gives the details of operation of the Van Dorn portable electric hammer, typical uses, and special pointers on maintenance and operation of the tool itself.

This book is a veritable storehouse of information for concrete, stone and brick contractors; plumbers; painters; carpenters; electricians; welders; modernization contractors; tree surgeons; and maintenance men because of the almost limitless uses for the portable electric hammer in the building and industrial fields.

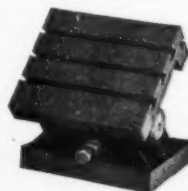
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for heavy
duty work.
Precision type
ball and roller
bearings assure
maximum capac-
ity for high speed
production and long
service.



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McMAHON

Adjustable Angle
Plate

For grinding any
angle accurately.

Two sizes

Model "A" with T slots

3 1/2 x 3 1/2 \$12.

Model "B" with tap hole

6 x 7 1/2 \$30.

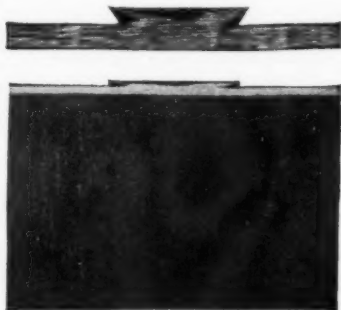
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open for dealers

FRANK McMAHON CO., 142 JUNE ST., DAYTON, O.

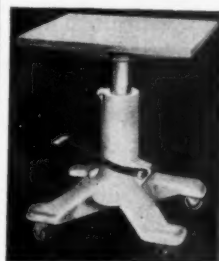
Welding Stainless-Clad Steel

The Composite Steel Division of the Jessop Steel Co., 603 Green St., Washington, Pa., has perfected a new method of welding stainless-clad steel that eliminates danger of reduction in corrosion resistance in the weld zone. In the past, some difficulty has been found in welding stainless-clad steel, due to the admixture of mild steel with stainless steel in the weld zone. This often occurred even when stainless rods were used throughout.



The new method maintains the full corrosion resistance of the weld zone, even when a mild steel rod is used for welding the backing. Fig. 1 is an unretouched photograph (top and cross sectional view) of a piece of welded Silver-Ply, a stainless-clad steel manufactured by Jessop, which has been subjected to a 24 hour exposure of a 20% salt spray mist at Pittsburgh Testing Laboratory. It will be noted from top view, that there is no more corrosion in the weld zone than in adjacent parts of the piece.

Fig. 2 illustrates the procedure for welding stainless-clad steel by the new method. Fig. 2A shows the plate as supplied, the lined portion representing the cladding. The plate is then scarfed and the cladding bent down with a follow-up tool or hammer, as illustrated in Fig. 2B. The primary weld (bead No. 1—Fig. 2C) is made with a $\frac{1}{8}$ -inch diameter stainless steel



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swivels and locks in any position. Can be varied $15\frac{1}{2}^\circ$ by slight foot pressure, leaving operator's hands free. Engineered and built by tool engineers, experienced in production of special machines, dies, jigs and fixtures for exacting requirements.

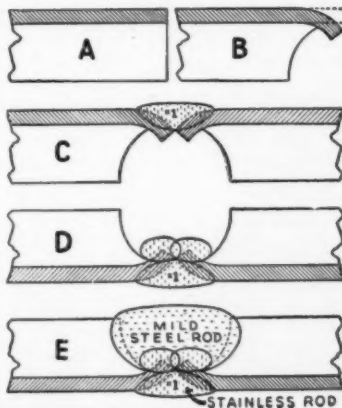
Send TODAY for illustrated catalog No. 2.

MIDWEST TOOL & ENG. CO.

112 Webster St.,

Dayton, Ohio

coated rod at the juncture of the two claddings. The two plates are then turned over and secondary welds made



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Inside and outside cuts on dies, shoes, templates and endless other jobs can be done in a small fraction of the time required by former methods. Saws, files and polishes. A highly developed, large capacity machine.

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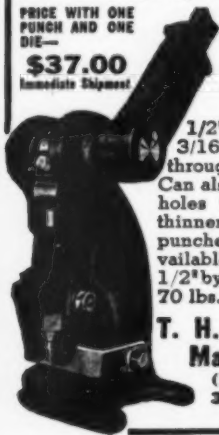
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Built for hard, tough work — die can-

not lose alignment with punch — all parts interchangeable.

\$37.00
Immediate Shipment



Capacity —
1/2" holes through
3/16" steel; 13/32"
through 1/4" steel.
Can also be made for
holes up to 7/8" in
thinner metal. Stock
punches and dies available from 1/16 to 1/2" by 64ths. Weight, 70 lbs.

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NEW YORK

on underside of exposed cladding, as indicated in Fig. 2D, using a 3/16-inch diameter stainless steel coated rod. The final weld (joining the mild steel backing) may be made with a 1/4-inch diameter mild steel coated rod. Fig. 2E represents the completed weld; bead No. 1 is then ground flat with the cladding.

In all cases where stainless rods are used, the rod should be richer in alloy than the cladding; for example, on Type 304 Silver-Ply use 25-12 rod; on Type 316 Silver-Ply use Type 317 rod. Lowest possible amperage and fastest possible welding time are recommended.

The procedure outlined permits great savings in cost of rods, since mild steel may be used to weld the backing.

**Carboloy Torch Brazing
Bulletin**

Carboloy Co., Inc., Detroit, manufacturers of cemented carbide tools, dies and wheel dressers, has issued a bulletin giving the latest methods of torch brazing Carboloy tools. It describes the process by which Carboloy users can braze tips into tool shanks.

Suggestions are given as to materials required, shank preparation, tip preparation braze assemblies, methods of cooling, designs for enclosed tips, and braze assemblies for special and multi-point tools.

Users and prospective users of Carboloy cemented carbides will find this booklet an excellent guide in making their own tools.

Copies of this bulletin (GT-116) may be obtained from Carboloy Co., Inc., 11139 East 8 Mile Road, Detroit, Mich.

**Centerless Grinding
(CONTRACT WORK)**

Precision, Accuracy, Promptness

Let us quote on your specifications.

THE HEIM COMPANY
Fairfield, Connecticut

Exports Rise

Totaling \$25,807,101, our exports of industrial machinery in August were 17% greater than the corresponding shipments in 1938, according to the Machinery Division of the Department of Commerce. The increase was well distributed over the various groups, ranging from 7% in mining, well and pumping machinery to 63% in textile, sewing and show machinery.

Machine tools led the advance in metal-working equipment, contributing importantly to the 14% gain in total foreign sales of power-driven metal-working machinery. The total in this class was \$9,870,911 compared with \$8,625,729 in August 1938.

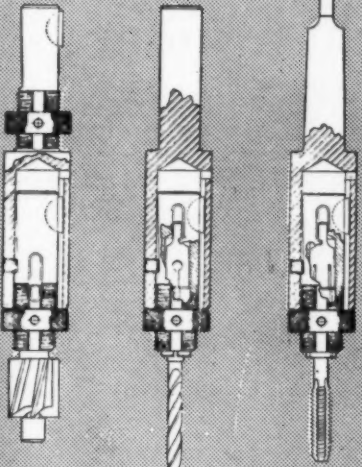
Lathe shipments totaled \$1,810,750 against \$1,329,822 a year ago.

Thread cutting and automatic screw machines amounted to \$568,977 as compared with \$187,892; milling machines \$1,686,018 — \$1,546,927; radial drills \$74,503 — \$17,450; planers and shapers \$338,547 — \$256,416; internal grinders \$465,997 — \$386,792; tool, cutter and universal grinding machines, \$436,371 — \$306,150; sheet and plate metal - working machines, \$612,220 — \$689,867; forging machinery, \$359,648 — \$95,404; rolling mill machinery, \$755,812 — \$874,220 and foundry equipment, \$120,257 — \$228,787.

Foreign sales of metal-working (except power-driven) equipment were 32% above August 1938 with a total of \$439,774.

August exports of power generating

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ADJUSTABLE EXTENSION ASSEMBLIES

SCULLY-JONES adjustable extension assemblies have been designed to permit a quick adjustment of the tool, in multiple spindle work, without disturbing the entire setup . . . to lengthen or shorten assemblies, simply release the set screws in the nut and body, then turn the knurled nut to secure the correct adjustment.

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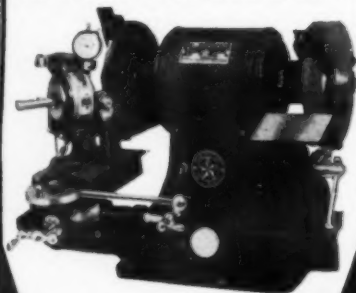
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SCULLY-JONES & CO.

1905 SO. ROCKWELL STREET, CHICAGO, ILL.

equipment (including electrical and automotive types) amounted to \$1,560,056—an advance of 13%. Most items in this category participated in the gain, the more important items including steam boilers, Diesel and semi-Diesel engines, other stationary and portable engines, accessories and parts.

Precision Drill Grinder



Produce Perfect Points

on standard twist drills in sizes from No. 41 (.096) to $\frac{3}{16}$ " (.625), with the STAR. Equipped with precision-made chuck. Lip angles 29 to 89 degrees, readily obtained. Each lip is set for grinding by indicator reading, making it possible to obtain variable clearances behind cutting edges.

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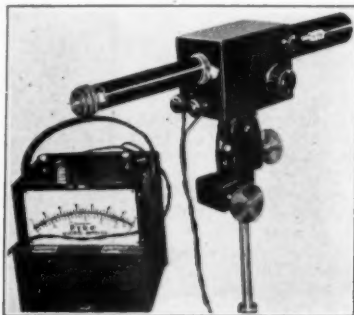
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Division Star Electric Motor Co.
Bloomfield, New Jersey

Micro-Optical Pyrometers

This new instrument permits measuring the temperatures of very small objects such as incandescent lamp filaments etc. It has a twenty-fold magnification of the object which is provided by means of an optical arrangement of high candle power and 37 m/m aperture. The image of the smallest wire or filament under observation will fill the optical field and completely cover the tip of the pyrometer filament range.



The instrument operates on the principle of a disappearing filament and is furnished with a direct reading scale over the range from 600°C to 3000°C and higher. The ammeter is compensated against variations in room temperature and has a so-called suppressed zero point in order to make better use of the scale, but only as far as is permissible with regard to constancy. Battery consists of four ordinary commercial flashlight cells. The unit is furnished with rigid support and tripod, the instrument holder being equipped with a fine precision double worm gear arrangement for the most delicate adjustments in any desired direction.

For further details please address
The Pyrometer Instrument Co., 102-105
Lafayette Str., New York, City.

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All hinges shown can be furnished with special holes, cutouts and bends to blue-print in metals to suit the job.

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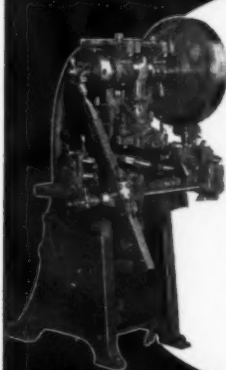
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SEMI-OFFSET



SPECIFICATIONS:
 Open Width $\frac{1}{8}$ " to 6"
 Gage Material .040 to .125
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 Lengths to 120"

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LITTELL Roll Feeds economically handle coil stock. Can be mounted on different styles and makes of presses.

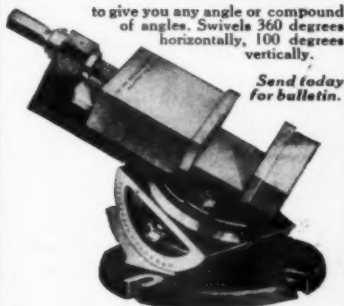
LITTELL also makes Feeding and Straightening Machines, Reels for Coil Stock, Scrap Cutters, Oilers, Assembly Machines, Air Blast Valves and Nozzles, and Safety Pickers.

Ask for Bulletin SEC. 41.



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The New Britain Universal VISE

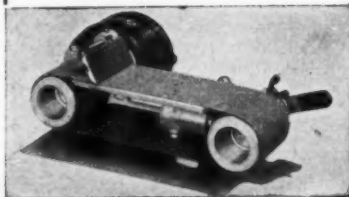


to give you any angle or compound of angles. Swivels 360 degrees horizontally, 100 degrees vertically.

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AN INEXPENSIVE ABRASIVE BAND GRINDER



"Built Like A Machine Tool"

The Hormel-M Grinder is sturdily built with a supporting leg under the grinding table to eliminate vibration and tipping due to pressure on belt. Ball bearing throughout, equipped with Alemite lubrication, complete with grease gun.

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 96 Warren St., New York, N. Y.

Spotlighted by Spring Temper with strong come-back



Sutton Collets for Lathes and Milling Machines

MADE from specially selected alloy steel. Expertly heat-treated to correct spring temper to resist wear and give a grip with a strong come-back . . . Threads chased with single-point tool to insure perfect alignment with draw bar . . . Precision ground to insure accuracy of taper and concentricity of hole.

Send for Sutton Catalog listing Collets for all makes of lathes and milling machines

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Represented in Canada by

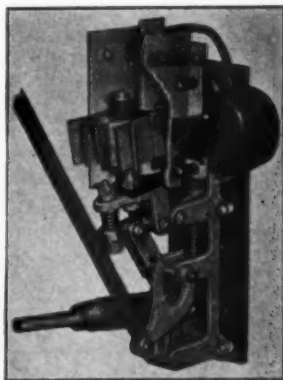
HI-SPEED TOOLS, Ltd. Galt, Ont.



Sutton DIAMOND-GRIP Collets
Fingers and other accessories
for screw machines

Knee-Action for Spot Welder Contactor

Superseding the usual dog or ratchet mechanism, the Pier Equipment Mfg. Co., Benton Harbor, Mich., makers of Ace-Peer Welders have incorporated a three element linkage design in their latest contactor or trip switch. This principle is like "knee-action" or toggle, closing the contactor until the knee joint pushes against the trip control lever, when the knee bends and opens the contactor. By changing the position of the trip control lever, the period of the welding stroke during which current flows and the amount of contact are determined. For thin metals, for example, the operator can select an extremely short welding time (2 to 3 cycles).



Mechanical parts of this new contactor, shown in the accompanying photograph, are steel and bronze with cotter pins used wherever possible and a minimum of screws and nuts. Magnetic blowouts quench the arc and save the contacts; refractory arc shields confine the arc, prevent wandering and burning. The contacts and their mountings are of heavy sections of rolled copper, self-aligning, easily adjustable for wear and easily replaced. It is claimed that useful contact life is more than doubled.

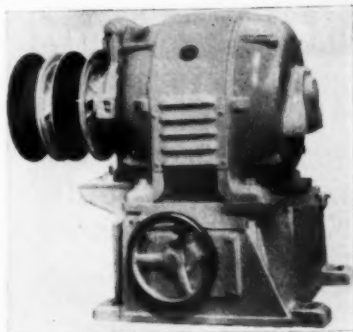
U. S. Electrical Offers Multiple Belt Variable Speed Drive

A new development is announced by U. S. Electrical Mfg. Co.—a multiple belt for variable speed drive motors. Speed changes on the unit are effected by turning the hand wheel which shifts the motor on the base and this moves the yoke which actuates the pulleys.

A new lubrication system provides a thorough method of greasing the pulley sliding fits. A hollow section of shaft is constructed through the pulleys and the grease is ejected through orifices from the hollow section of shaft to the sliding surfaces. The end of the motor shaft is also equipped with a grease fitting.

The belt may be tightened or loosened without shifting the entire base. This adjustment is made by working a set screw which turns the eccentric bushing located at the pivot point of the shifting yoke arm.

The sets of ways on the motor mounting base and the main unit base are very accurately machined; thus correct



alignment is assured, and a rigid sliding support for the motor is attained. Bulletins are available at U. S. Electrical Motors, Inc., Dept. 65, 80 Thirty-fourth Street, Brooklyn, New York.

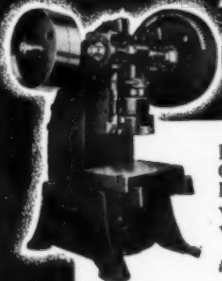
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why.

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Mill keyways in the run
or on the ends of shafting
already erected—save
money on alteration,
erection, and repair work.

Made in 4 sizes, for hand
or motor operation.

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429 Kent Ave., Brooklyn, N. Y.

ARMGLO CO.

Manufacturers of

**Manual and Automatic Resistance
WELDING PRODUCTION EQUIPMENT**
with Magnetic Timing Control

also

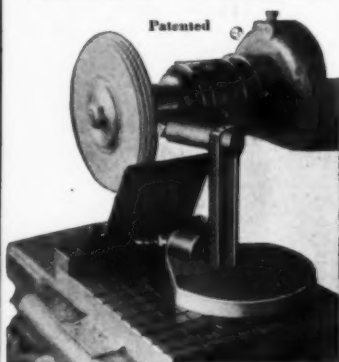
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**ARMGLO CO., 3520 W. Pierce Street,
MILWAUKEE, WIS.**

Reduce Hours to Minutes

with the
**"B-K" Wheel
Contour Dresser**



You save time and you avoid the bother of complicated set-ups and exacting measurements with the "B-K" Wheel Contour Dresser. No special skill or attention is required to dress wheels exactly in accordance with templates. You can grind form cutters profitably from the solid. There's no question about accuracy in the duplication of parts. There are no tedious adjustments—no loose fixtures or accessories. Adapted to any grinder carrying an 8-inch or smaller wheel

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MACHINE CO.**

Muskegon Heights, Mich.

Bliss Enclosed Design 4-E-10-120 Press

The E. W. Bliss Co., 53rd St and 2nd Ave., Brooklyn, N. Y. recently added a complete line of enclosed presses for the automobile trade and the stamping field. The unit illustrated is of the four eccentric type, the slide being actuated by a connection to each corner which is in turn driven by an ec-



centric. The eccentric shafts run front to back with the main bearings mounted in the heavy crown ribs, distributing the thrust loads throughout the crown. The press is double geared with herringbone steel gearing throughout the main drive, twin driving gears on the crankshafts, and with all gears running in a bath of oil.

The clutch is of the latest Bliss improved design, operated by electric push button control. Flywheel is Timken roller bearing mounted and can be stopped by a brake after power has been shut off. Barrel type connections on slide give an adjustment of six

L-W LATHE CHUCKS



4 JAW INDEPENDENT L-W LATHE CHUCKS

Semi-Steel body, ribbed construction, hardened and ground steel reversible jaws—Made to stand the gaff. We are proud to offer such Hi-quality at low cost.

Also Mfr's. of
Magnetic Chucks
Demagnetizers
Milling Machine Vises
Power Hack Saws
Dividing Heads

10" Size	\$27.00
12" Size	31.00
14" Size	36.00
16" Size	43.00
18" Size	58.50

Send today for new free catalogue

L-W CHUCK CO.

CHICAGO MOUNTED WHEELS OF V/T SUPER

150% LONGER LIFE

Chicago Mounted Wheels made of the new V/T Super Bond prove by tests conducted in many plants on snagging and exacting operations to have from 150% to 300% longer life. They're tougher; can take more punishment; grind more pieces per wheel, faster and without sacrifice of cutting action.

V/T Super Bond holds its original shape longer. Wheel will not ridge on grinding welds, sharp corners, sinking dies, barbering, and other work of this character.

V/T Super Bond meets the challenge of today's exacting requirements. Cuts your grinding cost. Let us prove it to you in your own plant on your toughest mounted wheel job



HANDEE TOOL OF 1001 USES

Here's a small "power house" that can be carried to any part of the shop and used wherever there is an electric outlet. Repairs hard-to-get-at parts on machinery without removing the part—smooths off rough spots on dies and moulds—cleans delicate mechanisms—grinds, drills, polishes, cuts, routs, carves, sands, saws, sharpens, engraves, cleans, etc. Uses 300 accessories. There are more Handees in use today than all other tools of this type combined.

TRY A HANDEE FOR 10 DAYS IN YOUR OWN PLANT

☐ Send wheel without cost. Size

☐ Catalog of Handee Products.

☐ De Luxe Handee on 10 Days' Trial

Name

Address

De Luxe model weighs 12 oz. 25,000 r. p. m. \$18.50 postpaid with 6 Accessories.

CHICAGO WHEEL

Makers of Quality Products

1101 W. Monroe St.,

Dept. Canadian Distributors: Canadian Trade Corp., Ltd.

PER BOND

GREATEST FORWARD STEP IN 30 YEARS

V/T Super Bond is one of the most important developments in mounted wheels. Wherever the use of a tough, hard bond that will stand the gaff is required, V/T Super Bond will be found without peer. Nothing can compare with it in endurance, stamina and performance. There is a shape and size to handle every grinding job faster, better and at lower cost.

Chicago Mounted Wheels

✓ The FIRST small abrasive wheels mounted on steel mandrels to be offered to industry.

✓ The FIRST with this special new and exclusive bond—V/T Super Bond, unequalled in strength and long life.

LET US SEND YOU ONE

To prove the superiority of V/T Bond, let us send you a CHICAGO Mounted Wheel without cost or obligation. Tell us the kind of job, type of equipment and size you want to use to make your own test.

Complete Catalog Free
Upon Request

HEEL & MFG. CO.
Quality Products for 40 Years

Dept. HB, Chicago, Ill.
Corp., Ltd. 1332 Williams St., Montreal

YES— SOMETHING NEW UNDER THE SUN



TOOLS

RECUT-RECONDITIONED-REBUILT

Do your Tools need Recutting, Reconditioning, or Rebuilding? We have complete facilities for satisfying your most exacting demands. For all your Tool Salvage problems we have the answer.



Let us Recut
your cutters, drills,
reamers, end mills and files;
Recondition your pneumatic tools
and parts; Hard Chrome your machine
parts and dies. Write today for our complete
catalogs.

HARD CHROME PLATING

EASTERN CUTTER MASTER TOOL
SALVAGE CORP. CO., INC.

Newark, New Jersey

Cleveland, Ohio

THE MASTER
CHROME SERVICE, INC.

Cleveland, Ohio

inches by electric motor. The slide is precision gibbed at all four corners with the sliding surface lined with bronze. Counterbalance cylinders are mounted in the uprights and bed, preserving the lines of the press.

The press operates at 14 strokes per minute. Bed area is 80" F. to B. by 120" R. to L. The die space, bed to slide, stroke down adjustment up, is 60", with the stroke of the slide 24". Rated capacity is 750 tons.

This new design is now available in many different sizes of the double crank, double eccentric, four crank, and four eccentric presses.

Laminated Shim Applications

An interesting Application Chart is offered by the Laminated Shim Co., Inc., 21-82-44th Ave., Long Island City, N. Y.

It places in the hands of present and potential shim users a comprehensive survey of proved applications for laminated shims or shim stock.

The applications listed are arranged for easy reference. Generous illustration of installation methods adds value to the chart as a handy guide. With it, any industrialist can quickly check his shim applications, to ascertain whether or not he is taking full advantage of the use of laminated shims throughout all of his machine assemblies or servicing.

Super Masonry Drill Chart

The correct masonry drill sizes for a representative list of makes and sizes of expansion shields or plugs are shown on an attractive new chart issued by Super Tool Co., 21650 Hoover Road, Detroit. In a vertical column, some 36 different commercial anchors and shields are listed. Across the top, diameters from $\frac{1}{8}$ " up are listed and in columns below, the proper masonry drill sizes are given. The chart is 11 $\frac{1}{4}$ x 17", printed on heavy paper, with metal reinforcing strips top and bottom. Copies may be had on request.

WHAT'S A *Small* DIAMOND GOT
THAT A *Big* DIAMOND HASN'T?



ANSWER: A Greater Area of
Hard-Working Tough Skin per
Carat of Diamond

Carboloy dressers are loaded from base to peak with small tough-skinned virgin diamond particles permanently held in a special matrix. No remounting expense. No diamond loss or waste. Cutting surface renewed in 10 seconds whenever needed. Try one for your rough, semi-finish and finish grinding wheel dressing jobs. Send for catalog DR-38.

CARBOLOY CO., INC.
71130 E. 8 Mile Rd., Detroit, Mich.
Chicago • Cleveland • Newark
Philadelphia • Pittsburgh • Worcester

Catalog
DR-38

• **CARBOLOY** •

DIAMOND IMPREGNATED WHEEL DRESSERS

IF YOU USE TAPS
YOU NEED
**WALTON
TAP
EXTRACTORS**



They remove
taps broken at or be-
low the surface of the
hole easily, quickly
and without injury
to the threads.

Send for Folder 132
giving sizes, styles
and prices.

Test their worth by
30-day Free Trial.

The Walton Co.
95 ALLYN STREET
HARTFORD, CONN.

Beg Your Pardon

In the October ad of David J. Ross & Co., Benton Harbor, Mich., it was inadvertently stated that stands would be provided for Rousselle Punch Presses at \$15.00 extra. It should have been explained that this is the price of the stand for the No. 0 model only. Stand for the No. 1 model is supplied for \$25.00 extra. A specially designed guard for motor drive is available at \$10.00 extra.

The snall, speedy, versatile Rousselle

punch presses are being adopted extensively to relieve larger, heavier presses from the many small jobs to be found in most plants. Because of their long stroke and ready adaptability, Rousselle presses are especially useful on trimming deep die castings and other types of deep draw work within their capacity.

Uses For New Thor Bantam

The Independent Pneumatic Tool Co., 612 W. Jackson Blvd., Chicago, have recently marketed a new 5½", 17 oz., rotary air grinder. For complete data and specifications of this new Thor tool they have issued a circular. It gives the uses for the new tool, (which is called Bantam) and depicts them in many interesting close-up action photos. All grinding wheels and accessories available are pictured and priced to give an idea of the versatility of this tool. This circular is colorful and instructive and gives the pertinent information in an easy to read style. It can be obtained by writing for circular P20.

MODERNIZE WITH MODERN MOTOR DRIVES

Twenty models for lathes, shapers, milling machines, turret lathes, punch presses, drill presses, power hacksaws, surface grinders and buffing lathes.

Hundreds now in use.

Send for the folder, "Econormize" for complete data on application and prices.

QUALITY

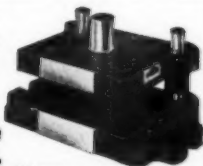
HARDWARE and MACHINE CORP.
5849 N. Ravenswood Ave. Chicago, Ill.

DANLY DIE SETS

Precision
Commercial
Special

Danly Machine
Specialties Inc.

1130 S. 52 Avenue, Chicago



DANLY DIE MAKERS' SUPPLIES



To get real production from your grinding wheels, they need to be dressed and trued regularly.

Use the **New Improved** Vincent Huntington dresser equipped with **Milled** cutters of **high-carbon** tool steel, and you can be assured the job will be well done.

Call your nearest Mill Supplies distributor. Insist on the dressers with the aluminum finish.

Write for descriptive catalog sheets.

VINCENT STEEL PROCESS CO.

DETROIT, MICHIGAN

2434 BELLEVUE AVENUE,

"IF IT'S A HUNTINGTON DRESSER OR CUTTER VINCENT MAKES IT"

Kennametal Cutting Chart

A new chart giving the correct grade of Kennametal for machining 21 types of metals, together with recommended cutting speeds, has just been made available by McKenna Metals Co., 135 Lloyd Ave., Latrobe, Pa. Materials listed include carbon steels, nickel chrome steels, nickel chrome molybdenum, chromium steels, high speed steels, Monel metal, free cutting steels and non-ferrous metals, in various states of

hardness.

The reverse side of the chart contains practical data on how to machine with Kennametal and includes two designs for grinding tools to produce crescent shaped chips or coiled chips as desired; also, the correct tool shape for interrupted cutting with Kennametal. The new chart is printed on durable varnish cardboard stock and has a hole punched at the top so that it may be easily hung from the wall or lathe.

MARKED - IDENTIFIED

Permanently

PART NUMBERS, CATALOG NUMBERS,
HEAT NUMBERS, SERIAL NUMBERS,
PATENT NUMBERS
MANUFACTURER—INSTRUCTION DATA—INSPECTION

Positive, Permanent MARKING ON YOUR PRODUCTS ASSIST PROSPECTS TO ORDER. MAKES IT EASIER TO BUY—NEW, REPEATS AND REPAIRS. GIVES YOU A DEFINITE RECORD OF PERTINENT DATA ON EACH PART PRODUCED.

The Pneumatic Marking Machine ILLUSTRATED IS OUR HI-DUTY MODEL 25 GENERAL PURPOSE TOOL FOR SHORT RUNS OR PRODUCTION WORK. IT OPERATES FROM YOUR SHOP AIR LINE AND IS ONE OF NUMEROUS MODELS BUILT TO PRODUCE NEAT, PERMANENT MARKINGS QUICKLY ON METAL FABRICATIONS.

WE WILL BE HAPPY TO MAKE SPECIFIC RECOMMENDATIONS UPON RECEIPT OF SAMPLES OR PRINTS OF PARTS TO BE MARKED, SHOWING APPROXIMATE LETTERING, ITS LOCATION ON THE PART, WITH REQUIRED HOURLY PRODUCTION.

MARKED PARTS ADVERTISE
IN THE RIGHT PLACE, AT THE RIGHT TIME.

Unlike John Alden —

"They Speak For Themselves."

GEO. T. SCHMIDT, Inc.

1802 Belle Plaine Ave., Chicago, Ill.
Builders of Marking Equipment Since 1895.



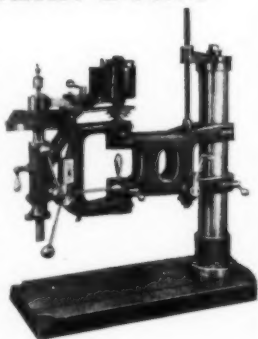
MODEL 25

Send for complete catalog of our full line of marking Tools, Machinery and Equipment.

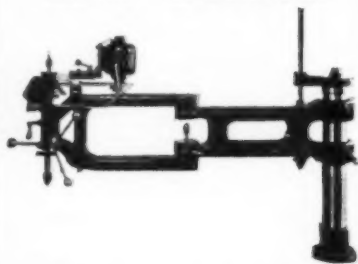
AYER Sensitive Bench Radial Drills

Drill capacity $\frac{1}{2}$ "; minimum distance spindle to column 6"; maximum distance, $31\frac{1}{2}$ "; minimum distance spindle nose to base 4"; maximum $21\frac{1}{2}$ "; spindle travel

5"; spindle bore Morse No. 2. Complete with high grade geared $\frac{1}{2}$ " chuck.



124" SWING



Up and down movement of arm on column (wall type) 14"; maximum distance of spindle to column 62"; maximum distance from spindle nose to base 19"; approximate weight 850 lbs.

F. H. AYER MFG. CO.
Chicago Heights, Illinois

Simplex Welding and Production Vises

A double swivel arrangement in the new Simplex welders' vise gives quick and easy angular positioning for a wide range of welding jobs.



In an instant the vise can be changed to a regular swivel base machinists' type.

Three models are available with $3\frac{3}{4}$ ", $4\frac{1}{4}$ " and $4\frac{3}{4}$ " jaws, opening to 5", 6" and 7" respectively.

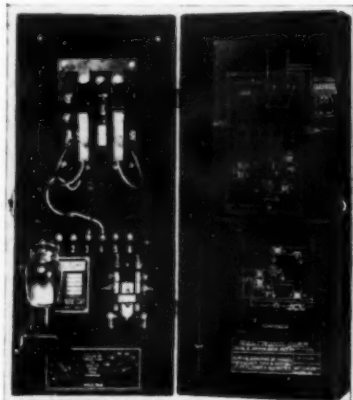
The Simplex production vise is designed to save time on production filing, fitting or assembly work. Raising or lowering the vise handle instantly opens or closes the vise. A cam in the slide gives a $\frac{1}{4}$ " throw to enable work to be inserted or removed. Setting the vise for the job, the handle is raised and then the knurled knob is turned until the jaw opening is $\frac{1}{4}$ " more than the width of the piece.

Three sizes are available each, in the stationary base and swivel base types.

Address The Desmond-Stephan Mfg. Co., Urbana, Ohio for bulletins giving complete information.

Modernizing Manually Operated Spot Welders

A new low cost combination weld timer and contactor to provide positive weld-timing control for virtually any manually operated 1 to 15 KVA spot welder and capable of such accuracy as to permit the welding of stainless steel, aluminum or brass with such equipment, is announced by Weltronic Corp., 2832 East Grand Blvd., Detroit, Mich.



Available for either 110, 220 or 440 voltages and 25, 50 or 60 cycle frequencies, the new timer - contactor unit, known as "Model 90-53" is adjustable in one cycle steps over the standard 1 to 60 cycle timing range.

Featuring low cost maintenance as a result of the absence of any moving time elements and having removable contacts for quick replacement, the device provides a compact, easily installed means of controlling timing accuracy for any type of work within the capacity of the spot welder with which it is used.

The unit consists of a single electronic tube, a relay and a contactor together with time selector switch mounted in a compact, spring hinged cover case.

A bulletin describing the unit and giving prices is available on request.

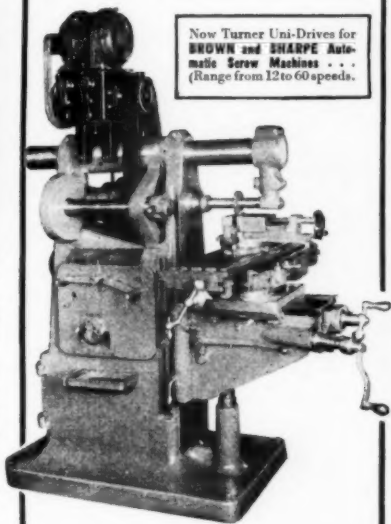
NOW a Turner UNI-DRIVE

— FOR —

MILLING MACHINES

The Turner Uni-Drive has NO overhang or side projection. Compact, quiet and efficient individual transmission. Ball bearing gears run in oil. Sizes $\frac{1}{2}$ H. P. to 10 H.P. Fully guaranteed. Can be installed (without drilling) in one hour.

Also built for LATHES, SHAPERS, RADIAL DRILLS, TURRET LATHES, etc.



Now Turner Uni-Drives for
BROWN and SHARPE Auto-
matic Screw Machines . . .
(Range from 12 to 60 speeds.)

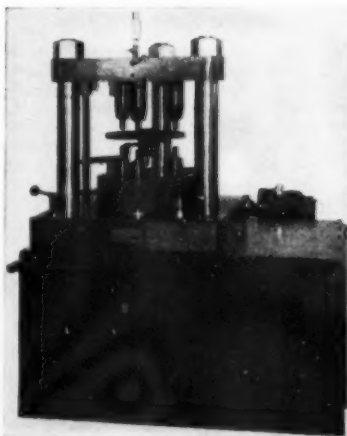
*Write for information and
name of dealer near you.*

The Turner Uni-Drive Co.
1638 Central St., Kansas City, Mo.

Gear and Hub Assembly Riveter Added to Hanna Line

A gear and hub assembly riveter is the latest addition to the Hanna electric hydraulic riveting line. These presses are of the strain rod and platen type. There are three pairs of dies for driving three rivets 120° apart, simultaneously. The upper set of three dies is stationary and the rivets are headed by a set of three lower movable dies. Each pair of dies acts independently of the other pairs although the tonnage on all pairs is exactly equalized. Thus, no harm to the assembly or to the press will result should two rivets or one rivet be struck instead of three.

The press is provided with a swing-out arm and mandrel for loading and sticking (assembly) of the work in a handy and safe manner. The rivets are inserted from above with the manufactured head up. When the swing-out arm is swung in against the stop, the axis of the assembly is accurately



located in relation to the dies. The operator then merely rotates the work until a set of three rivets comes into index with the dies. Depressing a treadle causes the assembly to be lifted to nest the manufactured heads of the rivets up into the stationary upper die cups. The press is controlled by two hand levers, a safety feature which assures the operator's hands being free of the dies.

Operation is by low pressure oil (1,000 lbs. per square inch) at which pressure, 25 tons are exerted between each pair of dies. This tonnage is adjustable and accurately maintained. The operation is very rapid — 20 cycles per minute of 3" stroke.



*Speedy—
Accurate—
Versatile—*

INDEX No. 39 High Speed Vertical Mill

Handles 90% of the work done on machines costing five times as much.

Designed for end mill work up to ½".

Swivel head is graduated 90° both ways.

Movable quill has 3¼" travel. Mills 8x16" die at one setting. Six speeds 375 to 2820 r. p. m. Let us quote you TODAY.

BLANK & BUXTON MCHY. CO.
JACKSON, MICH.

Armstrong Issues Catalog

Armstrong Bros. Tool Co., "The Tool Holder People," Chicago, announce a new (No. C-39) general catalog of all Armstrong lines which include: "Armstrong" Tool Holders; Carbon, Chrome-Vanadium and Detachable Head Socket Wrenches; "C" Clamps; Lathe and Milling Machine Dogs; Turret Lathe and Screw Machine Tools; Ratchet Drills; Bits, Blades and High Speed Steel; Setting-Up Tools; Machine Shop Specialties, and "Armstrong Bros." Pipe Tools.

Solenoid Catalog

A new catalog featuring custom-built solenoids, coils and transformers has been issued by the Dean W. Davis & Co., Inc., of 545 W. Fulton St., Chicago. Graphs giving technical information, plus illustrations of some of the many applications of solenoids, to modern machines are included. A copy of this catalog may be obtained by writing to manufacturer direct.

Larger Quarters for Strippit

The Strippit Corp., makers of the Wales type adjustable punches and dies, has moved from 1559 Niagara St., Buffalo, N. Y. to new and larger quarters at 1200 Niagara St.

They announce that many new designs and developments will be added to the Strippit line shortly.



STANDARDIZED JIG BUSHINGS

Prompt delivery from stock on over 10,900 standard items—over 6700 ACME Standard—over 4200 A. S. A. Standard—all completely finished ready for use. *Special sizes made to order.*

Made in our new plant by the most exacting and scientific methods—insuring accurate fit plus long wear—concentric within .0003" full indicator reading.

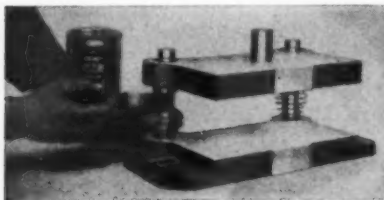
Send for bulletin containing complete data and low prices. Satisfactory service guaranteed.

Also manufacturers of complete machine parts, specializing in **hardened and ground parts** requiring **extremely close limits, lapped fits, etc.** also hydraulic appliances for pressures up to 20,000 lb. per square inch.

ACME Industrial Co.
210 N. LAFLIN ST., -:- CHICAGO, ILL.

Universal Oiler for Die Set Leader Pins

E. A. Baumbach Mfg. Co., 1810 So. Kilbourn Ave., Chicago, announce an automatic oiling system, which is applicable to any make of die set.



It comprises two simple units—a compression spring and an oil retaining ring. The oil retaining ring is made of steel and embodies a high-grade absorbent wick, which fits around the leader pin and rides up and down with the action of the punch press. The low tension spring, acting as a booster,

lifts the ring to sufficient height on the up stroke to assure spreading a film of oil on practically the entire length of leader pin.

This system is claimed to save undue wear on bushings, avoid troubles due



to faulty lubrication, as well as avoiding loss of valuable press and operating time. By merely stopping the press, compressing the spring by hand and swabbing the leader pin with a brush full of oil, which the wick absorbs, continuous lubrication is obtained.

The oilers are inexpensive and are said to pay for themselves speedily, through savings in bushing replacements alone. They can be used over and over on other jobs. Safety to operator is also promoted, because the spring acts as a guard, deflecting the punch press operator's hand from catching between the pin and bushing.

The oilers are available in sizes to fit leader pins from $\frac{3}{4}$ " to 3" in diameter, with spring lengths of $2\frac{1}{2}$ ", 4", 6" and 8".

New ACHIEVEMENTS

The new Gorton Mastermil, Super-Speed Universal Miller, and the new Gorton Accessories Catalog are three outstanding contributions designed especially to make new achievements possible for you in faster work, done better, more accurately . . . and at lower cost. The Gorton Mastermil is for work up to 30 inches square. Send us a piece of work to be done in our plant at no cost to you. We will supply complete time and cost data. Write today!

GEORGE
GORTON
MACHINE CO.

1115 13TH ST., RACINE, WIS.

BUY THIS GENUINE $\frac{1}{2}$ " SpeedWay Drill

and get these features
AT THE LOWEST PRICE EVER MADE ON
A QUALITY DRILL OF THIS SIZE

High torque SpeedWay Drill Motor
Streamlined Air Cooled Die Cast Case;
Direct Thrust Breast Plate Handle;
Removable side handle for close
quarters; Self Aligning Oilless Bearings;
500 R. P. M. Operating Speed
Smooth Sliding Thumb Switch.

Write for circulars and nearest
dealer location.

SpeedWay Manufacturing Co.
1822 S. 52nd Ave., Cicero, Ill.



Linde Announces Oxy-Acetylene Cutting Machine

A newly designed, stationary oxy-acetylene cutting machine, which is claimed to offer almost unlimited possibilities in cutting irregular shapes, rings, circles, straight line bevels, and performing several varieties of multiple blowpipe cutting, has been announced by The Linde Air Products Co., 30 East 42nd St., New York, N. Y. Known as the Oxweld CM-23 it includes many new operating advantages and material refinements in addition to the fundamental operating principles of the Oxweld CM-2, which the CM-23 machine now replaces.

Shapes are cut, either automatically with templets or guided by hand direct from a full scale drawing. It is available in two sizes, with cutting ranges of 54 and 81 in. in width by 12 ft. in length. The maximum cutting area is slightly less when the machine is used for hand-tracing. Circles ranging in diameter from 6 in. to 49½ in. (for the smaller size machine) and 72 in. (for the larger size) can be cut. Both sizes may be extended indefinitely longitudinally by the addition of 6-ft. lengths of machine legs and rails, and work support. In addition, the machine can be supplied, on special order, with a transverse capacity of 108 in. or 135 in.

A 3-hose cutting blowpipe is accommodated, of either the low-pressure or medium-pressure type. Multiple blowpipe mountings on the standardized models permit simultaneous operation of as many as four blowpipes. Steel plate can be cut up to a thickness of 12 in.

The carriage is driven by a small, variable-speed electric motor (110 volts, a.c. or d.c.). Speed can be varied from 3¼ to 48½ in. per minute when templet-tracing, and from 5½ to 82 in. when hand-tracing. The driving and tracing head is equipped with drive trunnions for automatic templet-tracing, but for hand-tracing of any design or pattern where the machine is not to be used for repetitive cutting,



the mechanical tracing unit can be detached and the line tracer substituted in the offset position to permit hand-guidance of the machine.

The makers will gladly send full details.

Just What You Have Been Wanting—An Economical Live Ball and Roller Bearing Center.



For Lathes, Hand Screw Machines, Grinders, and Mills

1. Simplicity and sturdiness adapt this center to heavy duty with extra long life.
2. Sufficient bearings for radial, thrust, and alignment loads resulting in 50% more radial load than the average live center.
3. Large spindle, small head, and short overhang spells rigidity—result, no chatter.
4. Has special oil seal to retain lubricant and resist foreign matter.

A folder giving prices and complete detail will be mailed to you just for the asking.

A lower first and last cost. Let us prove it by sending you one today for a ten day trial, and if not satisfactory in every way return it.

MOTOR TOOL MFG. CO.
12281 Turner Ave., Detroit, Mich.

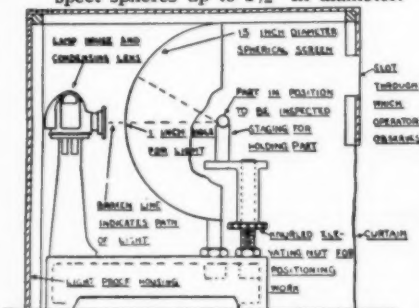
J. & L. Spherical Surface Comparator

The Jones & Lamson Machine Co., Springfield, Vt., announces a new Comparator, specially designed for inspecting spherical surfaces, such as those of balls used in precision ball bearings. Hitherto, the determination of the size and nature of flaws on highly finished surfaces of this type has necessitated the use of expensive instruments and highly skilled operators.

This new Comparator is said to make the inspection of these surfaces a very simple, yet exact procedure, without the necessity for skilled operators and with great economy of time.

The drawing illustrates the method. An enlarged true image of the surface being inspected is projected onto a concave hemispherical screen, 15" at its maximum diameter. Magnification naturally depends on the size of the work, a $\frac{1}{4}$ " ball for example

is magnified 60 times, and the instrument may be effectively used to inspect spheres up to $1\frac{1}{2}$ " in diameter.



COMPARATOR FOR INSPECTING SPHERICAL SURFACES

New Combination Saves Steps in Parts Handling

The combination of two well-known items improves parts storage and handling methods by eliminating the time-wasting transfer of small parts and materials from one container to another. With this combination, parts and materials are taken from one department to another in the same bins.

Stackbins, with full hopper fronts designed for storage, production and assembly work, are stored in the stockroom in Stackracks, individual steel units which lock together to form storage racks of any desired shape or capacity. The Stackbins can be slid out of the Stackracks, carried to any part of the plant—without removal or transfer of the contents, or any part of the contents can be easily removed from the Stackbins without disturbing the storage assembly.

Several leading manufacturers have discovered that the man-hours saved by this Stackbin - Stackrack combination have returned the low initial cost of the installation within short periods. Stackbins and Stackracks are made by Stackbin Corp., 48 Troy St., Providence, R. I.

NO. 1 1/2 GRAND RAPIDS UNIVERSAL CUTTER AND TOOL GRINDER
FEATURING MAXIMUM CONVENIENCE OF OPERATION
BULLETIN ON REQUEST
Gallmeyer & Livingston Co.
 405 STRAIGHT AVE., S. W., GRAND RAPIDS, MICH.

WHEN BUYING CUTTERS

look for the name



All standard sizes carried
in stock for immediate
delivery. Special cut-
ters made to
Blue Print.

As Cutter Specialists since 1919 we
are able to offer the highest *quality*
and *service* at *attractive prices*.

Write today for prices.

Few Territories Open.

QUALITY TOOL WORKS
WAUKEGAN, ILLINOIS

Standard Since 1911



**INCLINABLE
POWER
PRESSES**

LOSHBOUGH-JORDAN
TOOL & MACHINE CO.
1625 STERLING AVE. ELKHART, INDIANA

Whitney Chain Catalog

A handsome new Whitney V-135 silent chain drive catalog gives complete information for the selection and design of silent chain drive.

Included in the 64 pages is a wealth of engineering data, dimensions, horsepower ratings, and sprocket data, as well as, illustrations of typical drives in various industries.

Copies may be obtained from The Whitney Chain & Mfg. Co., Hartford, Conn.



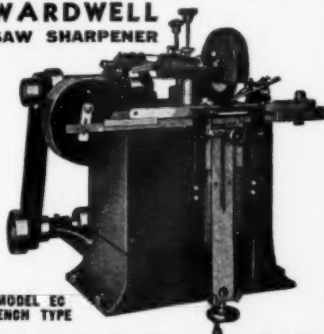
Essex

The makers of a complete line of lubricating devices since 1901.

Send for catalog.

ESSEX BRASS CORP.
2000 Franklin St., Detroit, Mich.

WARDWELL SAW SHARPENER



MODEL EC
BENCH TYPE

Automatically Sharpens Hack, Band & Circular Saws

with teeth as fine as 32 to the inch,
at a speed of 30 to 75 per minute.

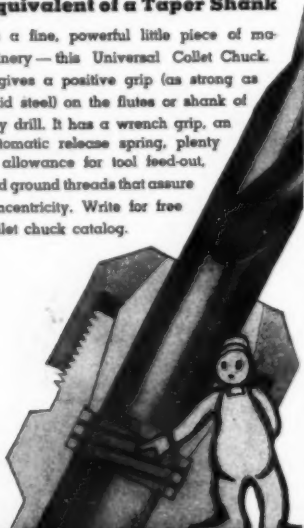
WRITE FOR CIRCULAR

The Wardwell Mfg. Co.
3165 Fulton Rd. Cleveland, O.



Universal Chucks Make a Straight-Shank Drill the Equivalent of a Taper Shank

It's a fine, powerful little piece of machinery—this Universal Collet Chuck. It gives a positive grip (as strong as solid steel) on the flutes or shank of any drill. It has a wrench grip, an automatic release spring, plenty of allowance for tool feed-out, and ground threads that assure concentricity. Write for free collet chuck catalog.



UNIVERSAL
Engineering Company
Frankenmuth, Mich.

Michigan Issues "Hobbing" Booklet

A practical discussion of all factors involved in the hobbing of gears, splines, etc., including formulae and charts for use by the shop as well as engineering department, is provided in a new booklet just issued by Michigan Tool Co., 7171 E. McNichols Road, Detroit.

Entitled "Hobbing" the booklet covers such topics as:—Setting up hobs, both for average as well as extreme precision work; figuring hobbing time; determination of causes of errors in the finished work; methods of calculating tooth modifications; elimination of flats; designing hobs; cutting speeds; hob sharpening hints; checking hobs for lead and contour; use of centering gages; use of trial 'dummies'; effect of hob and machine errors; use of multiple thread hobs; hob tolerances; etc. Copies of the booklet are available on request.

Booklet on Gear-Finishing

A 16-page booklet discussing the various methods of finishing gears has been issued by Michigan Tool Co., 7171 E. McNichols Road, Detroit. Edited for the practical shop man as well as the engineer, the booklet covers both rotary and rack shaving finishing methods, as well as the latest development "Curve-Shaving."

Uses as well as limitations of "Curve-Shaving" are discussed in detail. Included are sketches, etc., of tooth bearings produced by various means, and explanations of the causes of such bearing characteristics. Copies will be mailed on request.

HANDY RACKS



Four times the capacity in convenient floor and height space. Widely used in production and tool steel factories, vocational schools, colleges, warehouses, large and small shops. Low cost—no crating required. 30-day approval. Send for circular.

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Cut SHEET METAL

to Any Size or Shape
Straight — Circular — Irregular

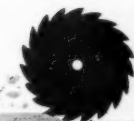
The BEVERLY SHEAR cuts flat, with clean, sheared edges, free from burr — without distortion and with minimum effort.

Two sizes—No. 1 weighs 16½ lbs. and cuts up to 14 gauge. No. 2 weighs 32 lbs. and cuts up to 10 gauge. Can be carried in tool box.

Write for
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SHEAR CO.,**

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CLEAN
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CHIPS**

Because Severance Midget Milling Cutters are hardened and drawn to 63-65 Rockwell — and then ground from the solid — they cut clean, sharp chips. Severance Midget cutters, tube burring cutters and chatterless countersinks reduce finishing time up to 75% on scores of metal, rubber or plastic products. Send us your problem or write for Catalog.

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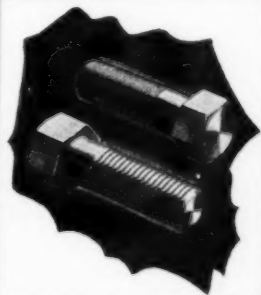
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For Time-Saving Fit

A profitable buy depends more on *results* than on the price you pay. Tough precision-made Triplex Cap Screws save time-speed work by smooth quick assembly. Accurate forming from strictly specified steel, clean-cut threads, modern heat-treating. Complete line — full finished and heat-treated or bright 1035's. Large stock for quick shipment. Write today for samples, prices.

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CAP AND SET SCREWS, BOLTS, NUTS AND RIVETS



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BURKE

MILLING MACHINES

Make Fast Work of Small Jobs

Motor
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Write today for
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Burke Machine Tool Co.
297 E. 16th St., Conneaut, Ohio

Super Presents New Service

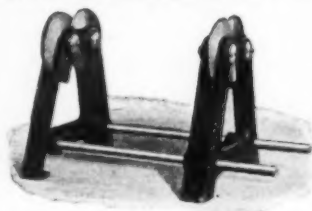
In view of the wide use of Tungsten Carbide tipped tools throughout American industry, the recent announcement by the Super Tool Co., of the inauguration of their new Carbide Tool Salvage Division should arouse interest.

The average user of Carbide Tipped Tools undoubtedly has on hand an assortment of broken, undersize, or obsolete tools, too costly to scrap, but of no use in their present condition.

Broken tools can be re-tipped if the shank is fairly good. Tips can be remounted when the shank is beyond repair. Reamers, counterbores, and other round tools as well as gauges, can be expanded and restored to usable size. Obsolete tools can be re-ground to new shapes or the tips remounted on new shanks.

A bulletin giving full particulars will be sent if you will write to Carbide Tool Salvage Division, Super Tool Co., P. O. Box 68, Harper Sta., Detroit, Mich.

ANDERSON Improved Balancing Ways



Four chilled iron discs rotate with minimum friction on sensitive special bearings, giving a prompt, sure indication of whether or not the work is in perfect balance.

Write NOW for full information.

Every shop handling rotating parts needs this simple, sturdy, dependable device for balancing, straightening and truing operations. Saves time and trouble and assures better work.

Swing	Greatest Distance Between Stand vds	Capacity in lbs.
20 in.	20 in.	1,000
40 in.	30 in.	2,000
60 in.	30 in.	2,000
72 in.	66 in.	5,000
96 in.	88 in.	10,000

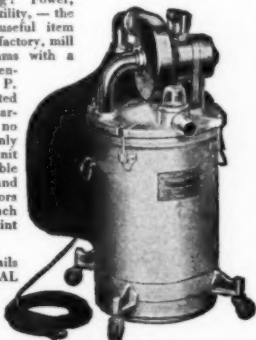
ANDERSON BROS. MFG. CO., ROCKFORD, ILL.
1907 Kishwaukee St.

**This Ever Ready All Purpose
Utility Unit Cleans EVERYTHING
ANYWHERE in the Plant**

**Breuer's Ball Bearing TORNADO
Industrial Vacuum Cleaner**

Has Everything! Power, portability, versatility, — the handiest, most useful item of equipment in factory, mill or shop. Vacuums with a $46\frac{1}{4}$ " waterlift, generated by a 1 H. P. G. E. Motor mounted on Norma Ball Bearings requiring no oiling. Weighs only 40 lbs. Power unit quickly removable for blowing dust and dirt out of motors and the hard-to-reach places. Sprays paint and insecticide.

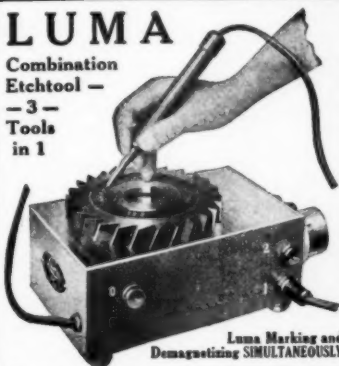
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BREUER ELECTRIC MFG. CO.
5108 N. Ravenswood Ave., Chicago, Ill.

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Combination
Etchtool —
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Tools
in 1



**Luma Marking and
Demagnetizing SIMULTANEOUSLY**

Writes on hardened steel — demagnetizes at the same time — with carbon point does light spot annealing and soldering jobs. Compact — easy to use — dependable.

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SPEED UP YOUR DIE WORK AND OBTAIN STILL GREATER ACCURACY

AN OLIVER DIE MAKING MACHINE will enable you to turn out more work in less time.

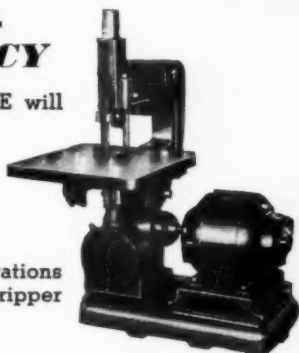
Produce better dies.

Use less skilled help.

Make real profits on your jobs.

For all sawing, filing and lapping operations such as dies, gages, cams, templates, stripper plates, production filing, etc.

Send for details—no obligation
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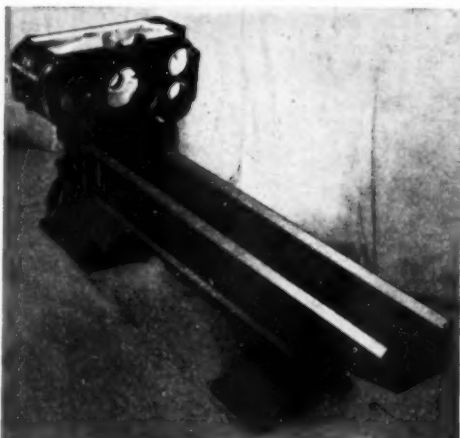
1408 E. Maumee St.
Adrian, Mich.

Warner & Swasey Increase Lathe Bed Strength

A new type of construction that is claimed to increase the strength and rigidity of cast iron alloy lathe beds as much as 30% is announced by The Warner & Swasey Co., Cleveland machine tool builders.

Now standard on all but the smallest of the Company's machines, the new construction features diagonal ribbing similar to bridge girder design, instead of conventional box type ribbing. In addition, all the stiffening sections are on the outside walls of the bed. This is said to give greater freedom from twist and vibration, so important today because of the demand for higher speeds and closer limits without subsequent grinding. Also it is easier for chips to

clear through the openings and fall into the pan. Greater space for chip clear-



\$25 BUYS A POSTEL (f. a. b. Minneapolis) DIE FILER



A dependable, precision tool that will soon pay for itself.

Write for full information

The Postel Filing Mch. Co.
915 Washington Ave., So.
Minneapolis, Minn.

ance, the engineers point out, is of increasing importance as the rate at which metal is removed is increased.

The diagonal ribbing extends into the section below the headstock. This, together with an outer tie member between head and bed, gives considerably increased strength in this region.

The new design is the result of co-operative work by Warner & Swasey's development and research laboratory and its engineering department. The greatly increased rigidity is attained entirely by means of a better distribution of metal. The total weight of the casting is not increased.



The "BABY GIANT" VANDERBEEK Universal Joints

are obtainable in two sizes—the "Baby Giant" for instrument and control work; and the "Giant", with hardened and ground working surfaces for heavy duty work.

Send us your requirements — We'll send you prices.

AMERICAN TOOL WORKS, INC.
26 FRANCIS AVE. -3- HARTFORD, CONN.



A Lightweight Heavy Duty Mall Sander

The Mall Tool Co., 7742 So. Chicago Ave., Chicago, introduces a new heavy duty sander known as the Mallsander. This is a high powered sander that sells at an unusually low price.

It is streamlined, light in weight and perfectly balanced for easy operation with right or left hand. Standard equipment includes 15 ft. of cord and plug, 7" backing pad and abrasive, and a special spindle lock that fastens the spindle when removing or applying the abrasive disc. This eliminates the use of loose wrenches.

It has a high torque, high powered, cool running motor, spiral bevel chrome nickel alloy steel gears and extra strong lightweight housings.

Bearings are dustproof, high grade ball bearings mounted on both shafts.

A large air inlet has been provided for adequate ventilation. It is arranged so that grit and dirt cannot lodge around brush holders, or be deposited on commutator.



Use in confined, close quarters is facilitated by the compact design—only 4" between top of sander and disc.

No load speed is 4200 r.p.m.

Overall length including discs is 16". New weight is 15 lbs.



SOCKET HEAD
CAP SCREWS

SAFETY HOLLOW
SET SCREWS

**MADE OF ALLOY STEEL
MILLED FROM BAR**

*Try Them On Your Next Job!
Or Write For Samples Today.*

**ECONOMY
MACHINE PRODUCTS
COMPANY**

5207 Lawrence Ave.,

Chicago, Ill.

CARROLL Universal Dividing Heads

22 Years of Popularity. 6", 10 1/4",
12" Swing. Right or Left Hand
Type.

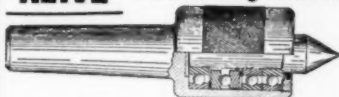


Rigid,
Accurate,
Long-
Life.

WM. CARROLL & SON

1776 Lexington Ave.. (Norwood) Cincinnati, Ohio

"ALIVE" Ball Bearing Centers



"They turn with the work"

Write TODAY — and let us
tell you more about them.

MODERN MACHINE CORP.

323 Berry St.,

Brooklyn, N. Y.

Putnam Expands Quarters

Providing production facilities necessary to meet the ever increasing demand for Putnam end mills and other lines of cutting tools, the Putnam Tool Co., of Detroit, has recently completed a new plant addition. The new building, fronting on McDougall Avenue, forms an "L" with the building on Charlevoix Avenue in which the company of-

fices are located and where the factory space is now being modernized to provide the best in present-day working conditions.



The new addition, planned to house a portion of the milling and turning department, is modern in every detail. Glass brick has been used along one entire wall. The roof truss construction eliminates all columns, providing a clear expanse of floor space. Walls and ceiling are painted white with a wainscoting of light gray, which, with ample window area and the glass brick, assure excellent lighting during the entire day for every machine.

With this new building, the Company now has adequate space for all present production operations as well as extra floor space which will be utilized as further expansion becomes necessary.

Moline to Make Rockford Units

Final arrangements have been made whereby the Moline Tool Co., Moline, Ill., will take over the manufacturing and sale of the special high-production drilling, boring and tapping machines heretofore manufactured by the Rockford Drilling Machine Division of Borg-Warner Corp., Rockford, Ill. The Moline Tool Co., will build these machines at their plant in Moline, together with their present, well known Hole Hog line of drilling, boring and honing machines.



PYRO

Indispensable in any MODERN non-ferrous foundry. Reduce spoilage and secure UNIFORM SOUND CASTINGS. Patented clamping device stops the pointer at correct indication — a PYRO feature.

Write for our bulletin No. 110.
Pyrometer Instrument Co.
 102 Lafayette St. New York

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Shear Cut

That's why
PROGRESSIVE
 End Mills cut
 faster and eas-
 ier and leave the
 smooth finish that
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Send for new cata-
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Erickson Precision Collet Chuck

A new collet - type precision chuck for drills, end - mills, etc. stated to possess unusual grip, also extreme ease and accuracy of set-up, even when broken drills are used, is manufactured by Erickson Steel Co., East 80th St., and Bessemer Ave., Cleveland, Ohio.



The chuck comprises four simple parts—shank, shank grip-nut, collet and nosepiece. All working faces, and the concentricity of holes, bearing and angles, are held to a tolerance of .0001". Collet is inserted in the shank and nose-piece tightened down upon it by means of the shank grip-nut; thus avoiding possibility of twisting the collet. Hexagon on outside of the nose-piece makes set-up easy by permitting two wrenches to be used. The collet is unusually collapsible, and will grip firmly and accurately, drill and end-mill shanks whose diameters differ by as much as 1/32". The construction, moreover, provides an eight-point grip instead of the usual three or four point one, thus giving increased resistance against loosening up. Since the collet grips equally well on flutes or shanks, broken drills or mills are usable without loss of accuracy. The

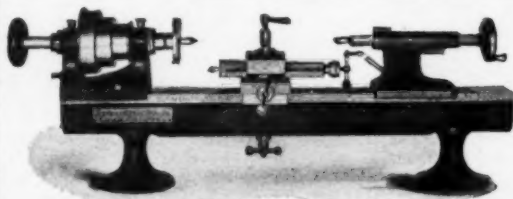
chuck-shank has an unusually deep hole, permitting a drill to be set far enough back to prevent vibration. This, and the eight-point collet grip, minimize breakage-risk even when heavy feeds and high speeds are used. The hardened small diameter nose piece permits working close up to flanges, in grooves, etc., besides giving the operator an unobstructed view. It may also be used as a stop—a useful feature on portable drills and similar equipment.

Chucks and parts may be had separately, or a complete set of Morse taper chucks, with collets from 1/2" diameter to No. 80 drill size, can be supplied in a substantial lock-box. Brown & Sharpe or Jarno tapers, parallel shank type, etc. can be furnished to special order.

American Cutter Enters Field

The American Cutter & Engineering Co., 1453-15th Street, Detroit, Mich., announces its entry into the field of manufacture of high speed metal cutting tools. The company is equipped to manufacture all types of milling cutters, reamers, counterbores, forming tools, etc. A complete engineering service is available to assist the trade in its cutter problems. Manufacturers' representatives or dealers are solicited.

Officers of the company are as follows: Gerald H. Reader, Pres.; Arlo J. Hillyard, V. P.; Milton Price, Sec'y-Treas. and Weldon C. Elliott is in charge of production.



WADE Bench Lathes

Economical, accurate, enduring for turning, drilling, threading, grinding, milling and screw machine operations.

Wade Tool Co.
Waltham, Mass.

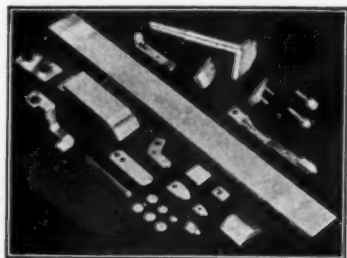
"Gibsily" — A New Contact Point Material

Electrical contacts, claimed to possess the high conductivity of pure silver as well as the low, constant resistance, are now being marketed to manufacturers of electrical equipment under the trade name of "Gibsily" by the Gibson Electric Co., 519 Blvd. of the Allies, Pittsburgh, Pa.

Because of its ductility, Gibsily—a powdered metal composition—may be formed into a wider variety of shapes than similar materials which, owing to their brittleness, must be cast to form. Moreover, Gibsily may be punched, machined, drilled, tapped and otherwise worked as easily as ordinary alloys. Some of the many shapes available, both of solid Gibsily and with Gibsily attached to base metal backings, are shown in the accompanying illustration.

Gibsily contacts are much harder than contacts made of pure silver and

resist wear to a far greater degree. Hardnesses range from that of pure silver to 200 Brinell B scale Shore Scleroscope for some grades of silver nickel-tungsten. They are free from galling and their high arc resistance greatly reduces welding or sticking.



The most common forms are silver-nickel-tungsten, silver-nickel-molybdenum, silver-tungsten, and silver-molybdenum. Each form is produced in different grades possessing varying physical properties. Certain forms, particularly silver-nickel-cadmium, greatly reduce transfer of metal from one contact to another on D. C. circuits.

The manufacturer will gladly supply complete information.

All-Angle Tool Distribution

For specialized marketing service required by rapidly increasing sales and production, All-Angle milling machine attachments and All-Angle vises will now be marketed through the Fray Machine & Tool Co., the tool division of Fray-Mershon, Inc., Glendale, Calif. Other lines produced by the Company will be marketed through the Fray-Mershon organization.

L. E. Mershon, general manager of sales for both companies, recently started a nation-wide trip, to call on distributors of the All-Angle milling attachments, and introduce the company's new quill-type machine. The George D. Miller Co., Rockefeller Bldg., Cleveland, Ohio, has been named exclusive distributor in that territory for All-Angle milling attachments.

No Mushrooming ▶
No Chipping ▶
Oversize Shanks ▶
Exclusive Knurled Back ▶
Exclusive Thumb Grip ▶
Broach-Rounded ▶
Corners



**and
 a
 complete
 line of
 Marking
 Devices**

Write for Price and
 data Bulletin No. 713-12.

**NEW METHOD STEEL
 STAMPS, Inc.**

149 Joseph Campau, Detroit

Lyon Utility Truck Easily Loaded and Unloaded

wheels with roller bearings and Ale-

A handy type of truck has been developed by the Lyon Iron Works, Greene, N. Y. and its utility and usefulness have been tested in many applications.

The present unit has been redesigned and greatly improved in the location of the rollers, the roller bearing type of casters used and is all electric arc welded, with the exception of attachment of the handle which is bolted so as to facilitate shipping.

Due to its low height and tilting features, it is very easy to load and easy to unload. The nose of truck can be pushed under a load easily and the rolls on the platform facilitate loading. To unload, merely tilt truck and the load rolls off.

The truck is particularly adapted for handling baskets or tote boxes of small parts. It is also very handy for moving crates, boxes, machinery and loads that are difficult to handle on other types of hand trucks.

The standard size is furnished with a platform 22" x 32½" (to end of nose 36"). Height of platform is 5", height of handle 30" above floor, made low to enable operator to reach over handle if desired when loading.

It is regularly furnished with two 4" stationary and one 3" swivel casters, all



mite lubrication. May be equipped with either semi-steel or rubber tired wheels. Weight of the truck is 100 pounds.

Johnson Friction Clutch Catalog

The Carlyle Johnson Machine Co., Manchester, Conn., announce a new 1939 clutch catalog, 10-pages, size 9¼" x 6¼", descriptive of Johnson Friction Clutches.

It covers the standard type of friction clutch with metal to metal frictions, as well as the Super-Johnson type with Raybestos faced expansion ring, the latter to run dry where such a method of driving is required. All recent improvements are also listed, as well as any changes in prices.



GEARS IN STOCK—IMMEDIATE DELIVERY

Gears, speed reducers, sprockets, thrust bearings, flexible couplings, pulleys, etc. A complete line is carried in our Chicago stock. Can also quote on gears of any kind. Send us your blue prints and inquiries.

Write for Catalog No. 70

CHICAGO GEAR WORKS,

440-48 N. OAKLEY BLVD.,
CHICAGO, ILLINOIS

New Respirator Cartridges Conquer Industrial Hazards

Wars in Europe come and go, but warfare waged by scientists against industrial hazards never ceases.

As evidence, announcement is made by American Optical Co., Southbridge, Mass. of the development of three new chemical cartridges which are quickly and easily interchangeable with the standard Type A dust cartridge now being supplied for the American R1000 respirator put on the market last year.

GEM VISES "For The Tough Jobs"

Our circular shows 6 different sizes and types of GEM VISES for Drill Press, Mill, Planer and Grinder work.

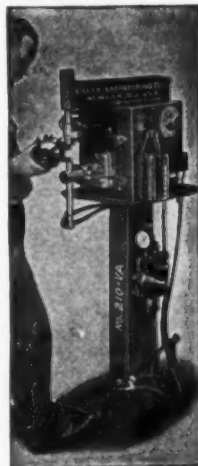
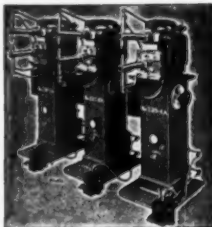
J.E. Martin Tool & Die Works, Springfield, O.



This one unique respirator, therefore, can now be obtained with a range of four protective filters, each providing highly efficient protection against Type A dusts or non-lethal concentrations of certain fumes and vapors.

One of the new chemical cartridges is designed for use against low concentrations of fumes and gases encountered in paint spraying, and other light organic vapors. If desired, a protective cover can be supplied to retard plugging when the respirator is used in paint spraying. The second cartridge can be used against low concentrations of acid gases, and the third against low concentrations of acid organic gases.

All three of the cartridges are alike in construction, differing only in the filtering element. They are long-lived, and thoroughly tested for uniform packing and high efficiency. A specially designed separator on the inlet side permits full use of the entire absorption medium. The wearer breathes easily, and is not subjected to objectionable odor.



Investigate our NEW VERTICAL PRESS TYPE WELDERS. Its something NEW for precision work. CHAS. EISLER has over 50,000 SPOT WELDERS in daily use, from ¼ to 500 KVA.

We also make standard and special TRANSFORMERS of all kinds.

WE INVITE CONTRACT SPOT WELDING IN LARGE OR SMALL QUANTITIES.

A. C. Arc Welders from 100 to 400 Amps.

Please write to us for more information.

Kindly mention Hitchcock's Machine Tool Blue Book.

CHAS EISLER
EISLER ENGINEERING COMPANY

762 So. 13th St. (Near Avon Ave.)

Newark, New Jersey

The Desmond
CRACKERJACK
 Grinding Wheel Dresser



The 4" dia. wheel is mounted on dust protected ball bearings with safety type handles. Three types.

It will quickly dress a square edge or bevel on your grinding wheel.

The Desmond-Stephan Mfg. Co.
URBANA, OHIO

Canadian D.-S. Co., Hamilton, Ontario

100%
 Adjustable
SHOP SPOTLIGHTS

Price \$3.50 in single lots
 \$3.35 in lots of six
 F.O.B. Chicago

CATALOG FURNISHED ON REQUEST

CHICAGO DIE CASTING MFG. CO.
 2502 W. Monroe St. Chicago, Ill.

NICHOLSON CONTROL VALVES

are made in two, three and four-way types for air, oil, water, steam, gas, etc., pressures to 5000 lbs. Style E is a general purpose valve for pressures to



Style J

300 lbs. Various metal combinations to suit any medium. Style J is for air and oil only, pressures to 125 lbs. Style H is a balanced hydraulic valve for pressures to 5000 lbs. We also manufacture foot, solenoid and motor-operated valves.

Bulletins on request.



Style E



Style H

OTHER NICHOLSON PRODUCTS: Mandrels, Arbor Presses, Flexible Couplings, Steel and Stainless Steel Floats, Steam Separators, Steam Traps, Air Separators, Air Traps, Air Vents, Etc.

W. H. Nicholson & Company

117 OREGON STREET

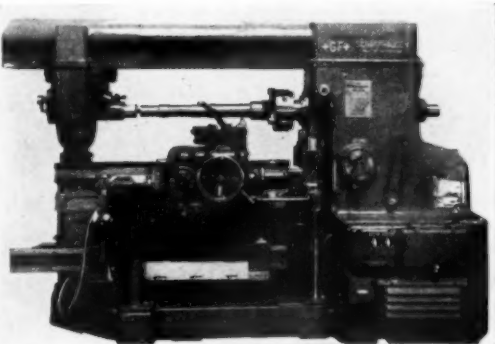
WILKES-BARRE, PA.

Switzerland Offers New Duplicating Lathe

This lathe, built on a new principle, is designed for copying or duplicating medium and heavy workpieces with varying diameters, tapers and contours, i. e. parts of alloy steels such as shafts for gears, machine tools, motors, pumps, fans, etc. The machine is manufactured by the Machine Tool Division of the Fischer Steel Works of Schaffhausen, Switzerland, and sold by W. A. Schuyler, 250 West 57th St., New York City.

The base, column, overarm and outside cylindrical support make a closed, rigid frame, within which the tool holder and workpiece are rigidly held, so that cemented carbide tipped tools can be fully utilized,

resulting in large output and accuracy of work.



For duplicating, a templet of mild steel sheet and of the same size and contour as the finished workpiece is attached to the lower part of the lathe. A tracer following the contour of the templet actuates the hydraulic mechanism, which in turn automatically raises or lowers the knee carrying the tool. Thus, the tool has to be set, by the operator by means of the handwheel, only for one diameter of the first workpiece; the other diameters or contours being set automatically by the templet and tracer.

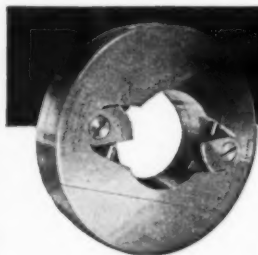
Another unusual feature is that the tool, mounted in a turret head, is placed directly below the work, and its top side

Cast
YOUR Hammers
with the **FIELD**
MOULD and LADLE

Low cost, simple operation.

JOHNSON TOOL CO., Inc.

65 Massasoit Ave., EAST PROVIDENCE, R. I.



*for
your
lathes*

SENECA FALLS *Automatic* WORK DRIVER

Self Centering . . . Quick Acting . . . No Slip. Attaches to any chuck plate or spindle. Provides a slip-proof, balanced drive reducing chatter. Handles rough forgings or turned pieces—straight or taper. Eliminates dogging time. Reduces tool breakage. Write for details and size range.

SENECA FALLS MACHINE CO., 314 Falls St., Seneca Falls, N. Y.

ERRINGTON MECHANICAL LABORATORY

MAIN OFFICE AND WORKS: STATEN ISLAND, NEW YORK

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CLUTCH OR CONE DRIVE

*Our High Speed Tappers
are Super-Sensitive for
Small Tapping*

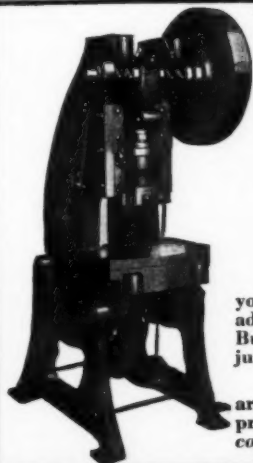


*All
Styles
and
Sizes—
0 to 2"
Taps*

*Style B
Positive
Adjustable
stop holds
work down*

*Style C Graduated
Adjustable Safety
Friction*

Style D-E, Quick Change Tools



NEW ROCKFORD PRESSES

*Built for exceptional
SERVICE*

Engineered for super performance and long life, you'll find in the New Rockford Presses, every modern advance—Chrome Nickel Crankshaft, Hard Bronze Bushings, Timken Bearing Back Shaft, to mention just a few.

There's a model for every requirement—and all are backed by more than 30-years' experience in press building. May we tell you more—and send a copy of our complete catalog?

ROCKFORD IRON WORKS
ROCKFORD—ILLINOIS

faces to the rear. The spindle and work-piece turn in opposite direction to that in the conventional lathe, so the chips fall to the rear over the sloping rear side of the knee.

The largest diameter that can be turned is 12 in., and the swing diameter is 19 in., with maximum length of 40 in. between centers. The work spindle has 8 speeds, ranging from 70-1200 r.p.m. and the 16 longitudinal feeds range from 3/16-20 in. per min. The spindle is driven, through V-belts and

ground gears, by an 18 h. p. motor, and the pump by a 3 h. p. motor. The overall length of the lathe is 8 ft. 4 in., width 4 ft. 8 in., and height 5 ft. 8 in.

Fafnir Ball Bearing Lineshaft Boxes

A new life-size 8-page folder issued by The Fafnir Bearing Co., New Britain, Conn., shows and describes their entire line of ball bearing lineshaft boxes. These embody as an exclusive feature Fafnir wide inner ring ball bearings with self-locking collars, which permit installation as a unit as supplied, without internal adjustments.

The folder explains the benefits to be derived from the replacement of plain bearing boxes with ball bearing ones. Complete details and specifications are given on all types of Fafnir hanger boxes, as well as general information on lineshaft construction which will be found helpful. Tables provide spacing data for mounting hanger boxes with couplings, standard keyseats for shafts, horsepower of shafting and belting, and suggestions for lubrication.




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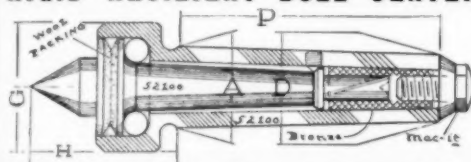
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Fits Black & Decker and Van Dorn grinders, sharpens twist drills correctly. Price only \$18.

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13-15 Main St., N. E.
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RIGID RESILIENT BULL CENTER



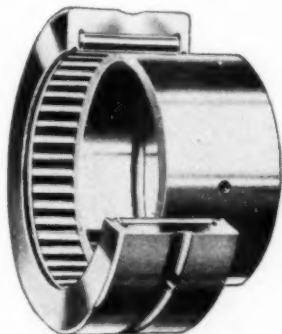
Rigid Tool Holder Co., 2,000 Witherell St., Detroit, Michigan

A disappointed buyer is slow in paying for his disappointment; while we have never yet, lost a dollar, on a purchase order; or a customer that we know of; and seldom send out a "Please remit". But we are real cranky, about good work, and good material. The best is none too good. Excellence in Designing and Manufacturing is Excellence in Advertising.

All Morse tapers carried in stock.

McGill "Solidend" Multiroll

McGill Mfg., Co., 1500 N. Lafayette St., Valparaiso, Ind., announces a design of full type needle roller bearing, to be known as the "Solidend" Multiroll, which is said to assure an increase in load-carrying capacity of as much as 12% over previous designs.



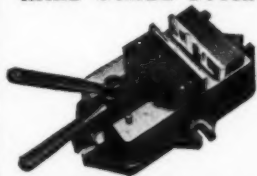
"Solidend" is intended to be descriptive of the new outer race construction, by which rollers are held integral without the use of end washers and retaining end rings. Roller retaining shoulders are built integral with the outer race so that the possibility of accidentally bending or breaking the conventional end washers, resulting in disassembling the unit, is eliminated.

Extra load-carrying capacity is provided by using full length rounded end

rollers instead of the usual trunnion or conical ends, thereby increasing effective race and roller contact. A variety of size combinations that can be used with or without the separable inner races in shaft sizes up to 5 in. facilitates the application of the bearings. Special and larger sizes can be worked out with the help of the McGill engineering department.

Whistler Perforating Dies

A most obvious feature of Whistler Universal Perforating Dies is their adjustability to new requirements—without additional die costs. All parts are interchangeable. When a change in a stamping—or a newly designed stamping—is required, the perforating or notching units can be quickly reassembled for the new operation. Whistler Universal Perforating Dies are adaptable to any type of press and to any thickness of flat sheets up to $\frac{1}{8}$ ". It is asserted that these die assemblies greatly reduce die costs, especially on stampings produced on a limited production basis. Also they are ideal equipment for work where frequent or occasional die changes are required. Detailed information will be supplied on request. A new catalog, containing valuable technical data, and charts, will be sent to responsible firms. In writing, please state type of work, press, etc. Address S. B. Whistler & Sons, Inc., 744 Military Rd., Buffalo, N. Y.

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Because it was designed to "take it"—and it does! It will stand up, day after day, under the heaviest, toughest strain of production milling work. Made of the best materials, with all parts interchangeable, it will outlast four or five ordinary vises. Rapid and accurate in operation—the top eccentric handle gives tremendous binding force, while the lower cam-faced handle gives instantaneous quick-opening and return. A trial in your shop will convince you better than anything we might say.

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Jaw width	5"	Maximum opening	3½"
Jaw depth	1¼"	Weight	40 lbs.

Also made in the swivel-jaw type with hard or soft jaws, maximum opening 2¼".

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We also Build Machinery on a Contract Basis,
Design and Develop Special Automatic Ma-
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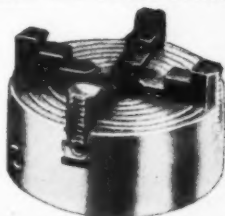
We've been making them for our own machines for 25 years. Exclusive design—without tie-rods. More compact! Heads removable without disassembling entire unit. All cylinders cast iron, machined and honed. All diameters, lengths and mountings. Hand valves; foot pedal valves; electric operated valves and our own exclusive design automatic self-operating valves. *May we quote you on your requirements?*

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SIZES

4½"
5½"
6½"
7½"
8½"
10½"
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EXACTA Combination Chucks are self-centering and independent. Jaws are reversible for external and internal work. A good investment for shops where short runs and variety of work do not justify frequent changes of chucks.

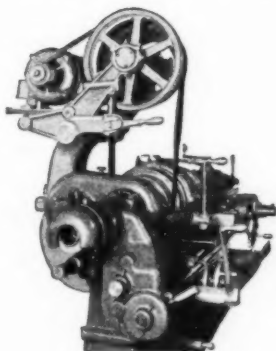
Write today for price list showing also SELF-CENTERING SCROLL and INDEPENDENT chucks. Whether you require lathe chucks now or in the future it will pay you to COMPARE our prices.

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- Variable Belt Tensioner Gives Instant Adjustment In Any Degree.
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THE TORQ ELECTRIC MFG. CO., 6606 Carnegie Ave., CLEVELAND, OHIO

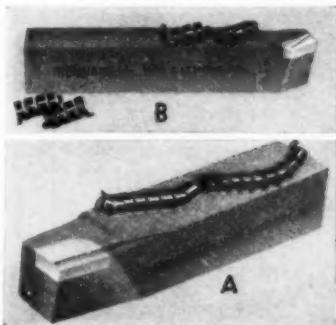
Kennametal Tool Forms

The McKenna Metals Co., 135 Lloyd Ave., Latrobe, Pa., announces two new forms of standard Kennametal single point turning, facing, and boring tools for machining steel either annealed, as forged, as cast, or in the heat-treated form up to 550 Brinell. These designs overcome the problem of convenient chip disposal in cutting steel at the highest speeds practical with Kennametal tools.

Figure A shows the parallel chip breaker form, designated as a chip curler, on a standard Style No. 11 right hand turning tool.

Figure B shows the chip breaker ground at an angle, usually 20° to 40° from the side cutting edge, which breaks the chips even of tough nickel steels by deflecting them against the unturned shoulder of the work, where they are snapped off into crescent shaped chips easily shoveled up. This is designated as a chip breaker form.

These chip breaker forms of Kennametal tools are particularly useful in



shaft turning work, steel roll and projectile turning jobs, and in general where large volumes of chips are produced per minute.

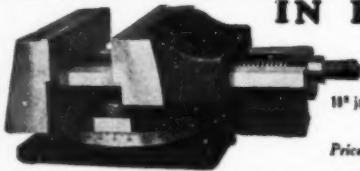
These tools with chip breaker forms are preferably re-ground in a fixture with diamond impregnated bakelite wheels, or they may be ground by hand with special loose bond silicon-carbide grinding wheels, to maintain this simple chip breaker form. The tools are asserted to cut at speeds three to six times as great as tools of high speed steel. The smooth, non-galling cutting action of Kennametal creating a minimum of "built up edge", even with low tool rake, results in easy machining of steel. Under ordinarily good conditions of machine rigidity, Kennametal tools of these designs will rough and finish in one operation.

NEW Unbreakable OILERS

TRICO OILERS maintain a constant level of oil in bearings. No guesswork, bearing failures, waste of oil or grease, oil-soaked motor windings, fire and accident hazards. A wonderful investment.

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TRICO FUSE MFG. CO.
 Milwaukee Wisconsin

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SQUARE BASE SHAPER VISE

The Shaper Vise has graduated base and tongue in center to fit slot in table, and has holes for bolting down. In ordering this vise give size of slots in Shaper Table, also distance from center to center of slots.

10" jaws, 2 1/4" deep, opens 8 1/2". Weight 125 lbs. \$46.80

Our complete line includes Vises for Drill Presses, Milling Machines, Shapers and Grinders.

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Chicago, Illinois



MARSCHKE

The SELECTIVE SPEED BUFFER with independent spindle drive, as shown in this illustration, is made in three sizes for 5, 7½ and 10 H. P. motors. It is only one of the several types and sizes of MARSCHKE BUFFERS.

The MARSCHKE LINE includes a wide variety of BUFFERS, FLOOR STAND AND SWING FRAME GRINDERS for the different conditions and different requirements of every plant in any industry.

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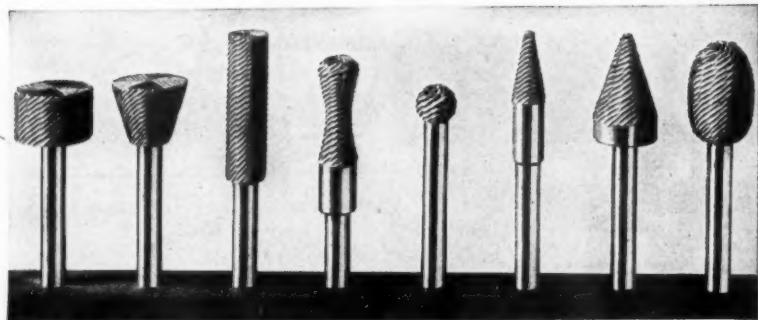
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Send for catalog showing machines
with 10" to 30" wheels and
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Rotary Files



Just a few of the many standard shapes which are carried in stock

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There's no chance for error when you use transfer screws as markers in setting dies. Points are of uniform height above hex base. Six accurately made and hardened screws nest in a special holder with hex wrench tip. Made in $\frac{1}{4}$ " to 1" diameters.

A TIME AND MONEY SAVER.

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Effect a 30% to 75% saving in tool costs, by having your worn - out or obsolete tools made over by RENU — and guaranteed as good as new, both for appearance and performance.

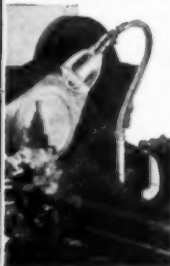
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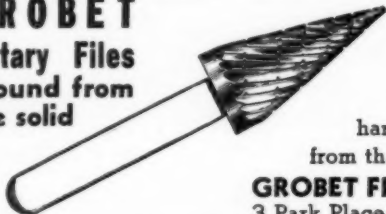
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hand cut, milled cut, ground
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De Bothezat Announces a New Fan Catalog

More than 200 of these axial flow pressure fans, ranging in size from eight inches to 10 feet, are included in a new illustrated 24 page catalog just issued by the De Bothezat Ventilating Equipment Division of American Machine and Metals, Inc. Copies of the catalog and price lists may be obtained by writing to De Bothezat at East Moline, Illinois.

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NAME-PLATE STAMPING MACHINE

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H. O. BATES

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Elizabeth, N. J.



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No. 1

\$95.00

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ELIZ. N. J.

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CAN BE
REPLACED.

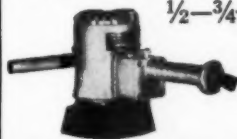
Grob Prepares for Export Trade

To give the necessary attention to the ever increasing demand from foreign countries for Grob equipment, Grob Brothers, Grafton, Wis., announce the appointment of J. Hall Burton as Director of Exports.

The addition of Mr. Burton to the staff should serve to give wider distribution of Grob products, which at present are in use in England, Belgium, Netherlands, Australia and South Africa.

CUTS GRINDING COSTS

1/2—3/4—and MORE



HEAVY DUTY

3 Phase
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Aberdeen, So. Dak.

"practical tools for practical men"

KNOCK-OUT**Lima Gear Shift Motor**

Here is a new quick change multi-speed drive unit that eliminates belt shifting and provides four speed changes under finger-tip control.



The compact automotive type transmission forms an integral unit with the motor. The sturdy and rigid mounting bracket is easily applied to all types of machine tools. A convenient hand wheel provides for spindle rotation in setting-up.

The steel transmission gears are heat treated and run in an oil bath with special oil seal closures.

Designed for use with 1800, 1200 or 900 r.p.m. motors, the capacity range is from one to 10 h.p. With a 1200 r.p.m. motor the speeds available are:—366, 607 and 1135 r.p.m., with 324 r.p.m. in reverse. A two speed (1200-600 r.p.m.) motor will provide six forward speeds ranging from 188 to 1135 and reverse speeds of 324-162 r.p.m.

A bulletin giving complete details may be had by addressing Lima Armature Works, 440 N. Main St., Lima, Ohio.

Excelsior Stainless Steel Sheet Polishing Machine No. 27-H

Polishing Stainless Steel Sheets by the Manufacturer are now available on a paying basis by utilizing the Excelsior simplified patented process.

EXCELSIOR TOOL & MACHINE CO., EAST ST. LOUIS, ILLINOIS

New Reamer Offers Advantages

The Evans Flexible Reamer Co., Ravenswood and Wilson Avenues, Chicago, have developed a new reamer which they claim will produce a chrome-like finish without honing; will not chatter; and provides 50 to 80 thousandths expansion range.

The Evans Reamer is made of high speed steel, has left and right spirals, and has extension pilots for line-reaming work. The full bearing surface assures perfect alignment.

According to the manufacturer, for 50 years, mechanics everywhere have been expending to get a reamed hole with full bearing surface and no chatter, and a reamer that would not fall in key ways and oil grooves. Some mechanics use a hone to grind off the high spots but have found the loose abrasive remains embedded in soft metals, such as bronze and aluminum. The new Evans reamer, it is asserted, overcomes these difficulties.

An unusual piece of equipment is the Evans 3-speed reaming machine. It utilizes a 1/4 h.p. motor of any required electrical characteristics, controlled by a foot operated switch. Equipped with a chuck that will take care of reamers up to 2 1/2" in diameter, it provides operating speeds of 30, 60 and 100 r.p.m.

Several items in the Evans line are especially useful for automotive servicing.



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Yes, with **Ideal** 'Select-O-Speed'! It's so inexpensive, so effective in reducing production costs that you can afford it for any machine — small or large! Provides accurate speed control for many types of machine tools, stockers, conveyors, mixers, ovens, etc. **Cuts Costs** by furnishing the exact speed needed by every job. **Lengthens**



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Life of new and old machines. **Provides** finger tip control of an infinite range of speeds through a wide ratio. Easy to install . . . economical . . . uses standard V-Belts. Sizes up to 7 1/2 H. P.

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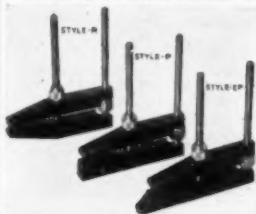
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All types of dies designed and built.

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No.	Style	Opening	Length of Jaws	Price
62-A	R	2 1/4"	3 1/4"	\$2.70.
62-A	P	2 1/4"	3 1/4"	3.00.
62-A	EP	2 1/4"	3 1/4"	3.30.
62-B	R	4 1/4"	5 1/2"	4.95.
62-B	P	4 1/4"	5 1/2"	5.45.
62-B	EP	4 1/4"	5 1/2"	5.95.

Compare these dimensions with the old style parallel clamps.

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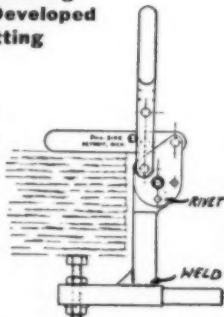
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A Newly Developed
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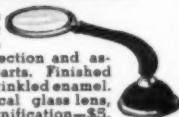
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Has two ball joints
fully adjustable for
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uses, also rapid inspection and
assembling of small parts. Finished
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Spectacle crown optical glass lens,
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3456 E. Jefferson, Detroit, Mich.

Bearing Data Slide Rule

A new slide rule presenting quick reference data on over 800 sizes of standard stock bronze bearings has been prepared by Johnson Bronze Co., New Castle, Pa.

This handy device is intended for engineers, designers and draftsmen who are not permitted or find it inconvenient to keep a copy of a regular bearing catalog on their desks. These rules are being offered free to responsible men. Write on your business letterhead.

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EQUIPPED"**

means no more coolant
worries. Coolant supply
is as steady and sure
as water flow from your
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GUSHER pumps
have no packing—no
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Priming is instantane-
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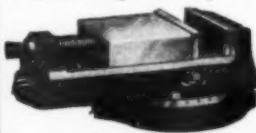
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SHELDON Arbor Presses stronger, handier, more versatile vises, correctly designed and accurately machined from quality materials with heat-treated and ground round rams with means for holding accurate alignment, and non-stripping alloy steel gears. 10 sizes, 3 to 10 tons. Simple, compound or wheel levers.



SHELDON Machine Vises come in 5 types
including: Drill Press, Milling, Shaper, Plain,
and Swivel base vises.

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The Sheldon Machine Co.
1629 N. Kilbourn Ave., Chicago, U.S.A.



Wiley's Offers A Larger Carbide Tool Grinder

Answering the demand for a larger Tungsten Carbide Tool Grinder than the No. K-20, Wiley's present the K-24, embodying the latest developments for this work.

Standard equipment contemplates a special design of $\frac{1}{2}$ h.p., ball bearing induction type motor, operating at 3450 r.p.m. The shaft is tapered at each end for positive wheel alignment. Thrust collar is provided on one end of motor shaft for end bearing adjustment. Splash lubrication has been supplanted by a gravity feed that saturates a felt retainer pad which is constantly contacting the diamond wheel. Motor control is by a drum type reversible switch. Tool rest tables are of semi-steel, accurately machined, provided with quick clamping features. Table adjustment is 30° from horizontal position.



Spindle height above floor is 43". Floor space required is 40" x 18". Tool rest table is 16" x 7". Net weight is 400 lbs. Diamond holder is $\frac{3}{8}$ " x $1\frac{1}{2}$ ". Wheel size with steel back is 8" x $1\frac{1}{4}$ " x $1\frac{1}{4}$ ". Rim 2". Diamond wheel is 6" in diameter, $\frac{3}{4}$ " x $1\frac{1}{4}$ " with a $\frac{3}{4}$ " rim. Surface speed of 8" wheel is approxi-

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FEATURES

Eliminates countershafts . . .
4 speed automotive transmission . . . All steel, heat-treated gears run in bath of oil . . . Hand wheel rotation of machine spindle . . . Instant reversability with all speeds . . . Designed for 1800, 1200 and 900 r.p.m. motors, either single or two speed . . . Adaptable for flat or "V" belt . . . Easily installed.

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440 N. MAIN ST. LIMA, OHIO



Cut Sanding Costs with a
STERLING
Speed-Bloc SANDER

Hand-sanding is costly—costly from EVERY angle: material, labor, time. Stop this unnecessary waste—turn it to profit—and in about three months you'll have paid for the equipment that brings you these great savings.

Sterling Speed-Bloc Sanders are used extensively in leading plants from coast to coast—showing reductions in labor and abrasive costs as high as 75%.

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mately 7000 f.p.m., and of 6" diamond wheel, 5000 f.p.m. Standard equipment of dresser includes two 8" vitrified silicon carbide wheels, protractor and diamond dresser.

For further details, please address Willey's Carbide Tool Co., 1340 W. Vernor Highway, Detroit, Mich.

Cleveland Punch Expands

Contracts for the construction of a 34,000 square foot addition for the Cleveland Punch & Shear Works Co., at 3917 St. Clair Avenue, Cleveland, have been awarded to The Austin Co., engineers and builders.

Steadily increasing activity in domestic markets has made the improvement necessary, according to W. D. Sayle, President of the Company. He stated that the project would represent an investment of approximately \$250,000 for the plant and equipment. The addition will accommodate machinery required in the manufacture of larger presses.



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Let us tell you the many advantages of our new D. C. and A. C. models now available. Also, see our new line of Magnetic Parallels and Midget Chucks.

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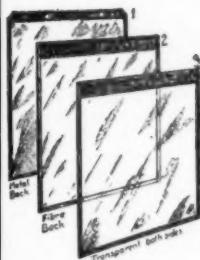
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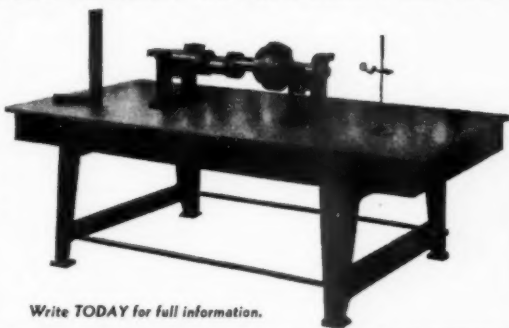
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1663-H E. 118th St., Cleveland, O.

Useful in any Modern Shop
48"x96" MILWAUKEE SURFACE PLATE

Rugged, semi-steel construction accurately machined—provided with cross ribs every 13" for rigidity—securely mounted on cast legs which are machined and provided with SAE adjusting screws for perfect alignment. Height from floor to top of plate 33". Shipping wt. 3300 lbs.

We also make planed and scraped surface plates of various sizes.



Write TODAY for full information.

J. C. BUSCH COMPANY

E. Pittsburgh Ave. and So. Ferry St.,

ENGINEERS AND MACHINISTS
SINCE 1907

MILWAUKEE, WIS.

New STOW Junior

FLEXIBLE SHAFT MACHINES STAND THE GAFF!



Stow Junior
Prices as
low as
\$35.00

As Illustrated
\$44.50
f.o.b. factory

COMPARE!

- * Rugged oversized flexible core. Tough, oil-resistant rubber outside casing.
- * Motor-end of shaft reinforced. Oilite bearing.
- * Hand piece—ball bearings, labyrinth oil seal. Removable clamp spindle.

Now, on general utility jobs, you can have *satisfactory results* in grinding, filing, wire-brushing, sanding, polishing, buffing and drilling without the investment in production-type machines—and at a big saving in operation and upkeep. For STOW now offers these *Utility Flexible Shaft Machines*—patterned closely after STOW Production Units—at popular low prices—and with proved STOW features giving reliability and long life.

The New Stow Juniors represent a new **VALUE** achievement, based on increased manufacturing volume, plus design standardization. They are the result of the 65 years experience with all kinds of Flexible Shaft applications by STOW engineers.

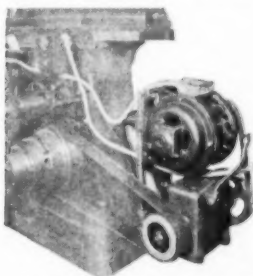
Write for full information and low prices **TODAY!** We will be glad to send you the name of your nearest dealer.

Also Manufacturers of Stow Heavy Duty Flexible Shaft Machines for High-Volume Production Operations.

STOW MANUFACTURING CO., INC.
30 Shear St., Binghamton, N.Y.
Established 1875 Inventors of Flexible Shafts

Berkeley Rounds-Out Drive Line

The Berkeley line of machine tool drives has been extended to cover a wider range of applications by a recent addition. The new drive embodies a quick-change multi-speed transmission. With this new gear box, the speed ratio may be changed instantly by shifting a single speed change lever.



The illustration shows the new drive applied to a shaper. It can be attached just as easily to lathes, milling machines, presses and other machine tools, requiring from $\frac{1}{2}$ to five h.p. motors.

The regular unit provides three speed ratios. A four speed transmission is also available and additional speed ratios may be had through the use of multi-speed motors.

The transmission unit is sturdy, silent and dependable. The gears are hardened and run in oil. Pulley shafts are ball bearing mounted.

The Berkeley line also includes the familiar V-belt and V-belt-helical gear combinations, featuring the "Tension-Tool" for quick adjustment of belt tension.

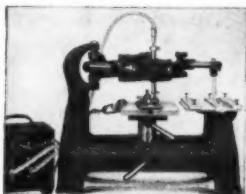
Another recent Berkeley innovation was the P. O. S. (Positive Optional Speed) drive. This model incorporates an infinitely variable speed ratio, obtained by means of an expanding-contracting pulley. This provides speed variations in micro-increments over a three to one range, controlled by a convenient hand wheel.

Bulletins describing all of the different models may be had by addressing Berkeley Engineering Co., 1381 E. 17th St., Cleveland, Ohio.

Preis Combined Engraver and Electrical Marker

A new bench type machine for general engraving work on all materials, and electric etching on soft or hardened steel, has been introduced by H. P. Preis Engraving Machine Co., 155 Summit Street, Newark, N. J. Separate heads, quickly interchangeable, are used for the two classes of work. The machine is shown with electric etching head in place, and the transformer which provides voltage control for light, medium and heavy etching.

On engraving work, depth of cut is controlled, independent of the depth of the master characters, by a micrometer adjustment mechanism on the engraving head. Movement of the engraving cutter to and away from the work is controlled by a cam-action drop lever, thus eliminating the necessity of raising and lowering the pantograph. For engraving on uneven surfaces, or on objects varying in thickness, an automatic depth-of-cut regulator is furnished. It is said that either raised or sunk engraving can be produced, and work on slightly concave or convex surfaces is handled as readily as on flat surfaces.

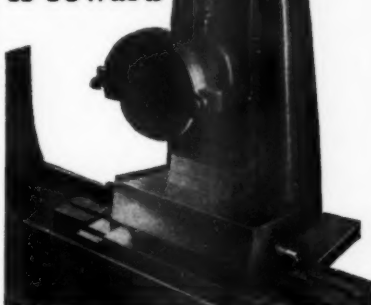


The compactness of this unit, and the fact that it can be plugged into any light socket, are features which should recommend it for a wide range of industrial and commercial work. An illustrated folder is available on request.

Ward Machinery Catalog

Catalog No. 39 has just been issued by the Ward Machinery Co., 564 W. Washington Blvd., Chicago. This 64-page, profusely illustrated catalog describes machines, tools, and supplies for fabricating sheet metal.

The Modern Trend Is Toward



New Surface Grinders Plus The MAGNA-SINE

New surface grinders are being installed to boost next year's production and to increase next year's profits. Magna-Sines are also being purchased to add further to the efficient use of these machines.

As a case in point, here's a concern specializing in the manufacture of lamination dies who order—almost simultaneously—a new grinder and a new Magna-Sine. The Magna-Sine, in this instance, was a Model B-10, which is especially adaptable for use on small surface grinders. In the illustration above it is shown being used for the grinding of one die section on a 10° angle. In some operations, groups of sections are positioned on the Magna-Sine table at one time.

On your new grinders or on your old equipment, these precision-built magnetic chucks—adjustable to any angle or combination of angles—will give you the most modern and accurate method of handling any angular grinding operation.

WRITE FOR COMPLETE DETAILS.

ROBBINS ENGINEERING CO.
639 Mt. Elliott Ave., Detroit, Mich.

LET US QUOTE...



Our new modern plant is fully equipped with special machinery for

**COMMERCIAL JIG BORING,
DESIGNING AND BUILDING
of
DIES, JIGS AND FIXTURES
LARGE OR SMALL**

We can handle your Jig Boring jobs at reasonable prices on our new 18"x36" Pratt & Whitney Jig Borer. Quick service.

Have been delivering satisfaction since 1929—let us serve you.

QUALITY TOOL & DIE CO.

Ray W. Rice, Manager,
401 N. Noble St., Indianapolis, Ind.

"ALNOR" Velometer An All Purpose Air Velocity Meter —Instantaneous, Direct Reading.



Measures total and static pressures as well as velocities.

Write for catalog
**ILLINOIS Testing
Laboratories, Inc.**
110 W. Austin, Chicago

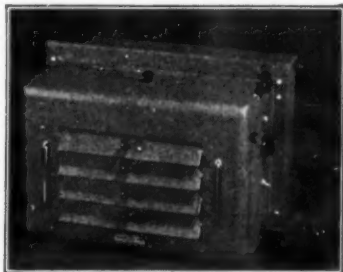
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EASTERN CENTERLESS WAY
ACCURACY-FINE FINISHES-LOW COST
Large or Small Lots**

EASTERN CENTERLESS GRINDING CO.
624 Capitol Ave., Hartford, Conn.

Ad-Lee Window Ventilators

Elimination of draft, removal of 92% of all dust and pollen, dissipation of smoke and odors, subduing of outside noises and providing air circulation under rain, snow, sleet and "dead" air conditions—these are some of the attractive claims for the Ad-Lee Health Air Window Ventilator.

Complete in itself, portable, inexpensive to buy and operate, the unit can be fitted to any window and is furnished to operate from any a.c. or d.c. outlet.



Providing pure, filtered air circulation, under complete control, these units are said to prove a worthwhile investment from the standpoint of employee's health, reducing or eliminating colds and consequent lost time.

Standard finishes are battleship grey and mahogany brown. Special finishes may be had at a slight extra charge.

Full details may be had by addressing The Ad-Lee Co., Inc., 825 So. Wabash Ave., Chicago, Ill.

KUTMORE HIGH SPEED

Adjustable Hollow
Mills with
Twoway Microm-
eter Adjustment
Cutting capacities
up to 2 1/2".

Ask for Catalog
No. 12.

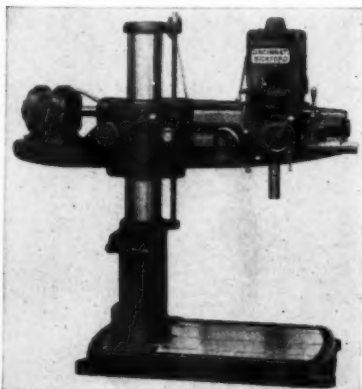


Reisinger Mfg. Company
837 Lake Ave., ROCHESTER, N. Y.

A Super-Service Radial By Cincinnati Bickford

Developed especially for applications using small drills and taps in fairly large parts, this new 2½ ft. high speed radial can be equipped with automatic tapping control.

With a constant speed motor, three changes of spindle speed are provided by the geared head. Six speeds may be had through use of a two-speed motor. Control of the latter is provided by a fast-slow-stop switch at right side of head.



Setting the direct reading lever at center of head, three rates of power feed are available, viz., 0.003", 0.006" and 0.009" per revolution of spindle. Power feed is engaged by the quick return levers directly over spindle.

Thrust and radial loads on spindle are absorbed by precision anti-friction bearings. Feed rack is an integral part of spindle sleeve. Both spindle and sleeve are counterweighted.

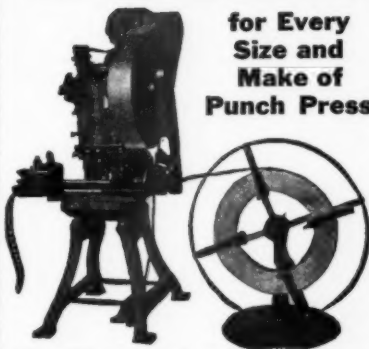
Power elevation of the arm is standard, with top and bottom supports for elevating screw.

Spindle control lever for forward-stop-reverse is at lower left of head. This operates built-in push buttons controlling the 1 h.p. reversing motor.

Full details may be obtained by addressing The Cincinnati Bickford Tool Co., Oakley, Cincinnati, O.

WITTEK AUTOMATIC ROLL FEEDS

for Every
Size and
Make of
Punch Press



**FAST — ACCURATE !
SAFE — AUTOMATIC !**

WITTEK Roll Feeds will protect you and your operators. Presses are kept operating up to capacity—feeding any stock from coils in lengths up to 24" per press stroke—saving in time, dies and production costs. Single roll, double roll and compound types with straightener—fits any press without alterations.



WITTEK Reel Stands
— 6 models — enable
one man to center
heavy coils. Ball bearing
mounted—adjustable
to any height—
balanced at any angle
—500-lbs. capacity.

Send for Bulletin "HF"
giving complete details.

A size for every
requirement.

WITTEK MANUFACTURING CO.
4305-9 W. 24th Place, Chicago, Ill.

Buyers' Directory

Abrasive Cut-off Machines

Cincinnati Electrical Tool Co., Cincinnati, Ohio
Tannewitz Works, Grand Rapids, Mich.

Adapters, Adjustable

Glenzer Company, J. C., Detroit, Mich.

Air Filtering Machines

Lincoln Electric Co., Cleveland, Ohio

Alloys, Low Melting

Cerro de Pasco Copper Corp., 44 Wall St., N. Y.

Angle Plates

McMahon Co., Frank, Dayton, Ohio

Arbors

Kearney & Trecker Corp., Milwaukee, Wis.

Balancing Ways

Anderson Bros. Mfg. Co., Rockford, Ill.

Sundstrand Machine Tool Co., Rockford, Ill.

Baling Presses

Galland-Henning Mfg. Co., Milwaukee, Wis.

Ball Bearings, Miniature

Landis & Gyr, Inc., 104 5th Ave., N. Y. C.

Band Saw Machines, for Metal

Armstrong-Blum Mfg. Co., 5741 Bloomingdale

Ave., Chicago, Ill.

Delta Mfg. Co., Milwaukee, Wis.

Grob Brothers, Grafton, Wis.

Kalamazoo T. & S. Co., Kalamazoo, Mich.

Oliver Machinery Co., Grand Rapids, Mich.

Tannewitz Works, Grand Rapids, Mich.

Wells Mfg. Co., Three Rivers, Mich.

Bar Cutters

Buffalo Forge Company, Buffalo, N. Y.

Ryerson & Son, Jos. T., 16th & Rockwell, Chgo.

Bearings

Chicago Die Cast. Mfg. Co., 2502 W. Monroe, Chgo.

Belt Sanders

Skilsum, Inc., 3304 Elston Ave., Chicago, Ill.

Belts, V-Type

Delta Mfg. Co., Milwaukee, Wis.

Bench Legs, Steel

Standard Pressed Steel Co., Jenkintown, Pa.

Bending Machines, Hand and Power

Rath & Co., Cyril, Cleveland, Ohio

Buffalo Forge Company, Buffalo, N. Y.

Lewthwaite Machine Co., 311 E. 47th St., New York, N. Y.

Bending Rolls

Buffalo Forge Co., Buffalo, N. Y.

Marshalltown Mfg. Co., Marshalltown, Ia.

Ryerson & Son, Jos. T., 16th & Rockwell, Chgo.

Bins

Stackbin Corp., Providence, R. I.

Bits, Tool, Hand and High Speed

Vincent Steel Process Co., Detroit, Mich.

Blow Torch, Pumps

National Safety Device Co., 836 Hubbard, Chgo.

Blowers, Portable Electric

Breuer Electric Mfg. Co., 5108 N. Ravenswood

Ave., Chicago

Buffalo Forge Co., Buffalo, N. Y.

Clements Mfg. Co., 6650 Naragansett, Chicago

General Blower Co., 401 N. Peoria St., Chicago

Skilsum, Inc., 3304 Elston Ave., Chicago, Ill.

Bolts and Nuts

Triplex Screw Co., Cleveland, Ohio

Books, Engineering and Technical

Starrett Co., L. S., Athol, Mass.

Boring Bars

Chi. Tool & Eng. Co., 8400 So. Chi. Ave., Chgo.

Boring Heads

Flynn Manufacturing Co., Detroit, Mich.

Brakes, Hand and Power

Deits & Krump Mfg. Co., 7440 S. Loomis

Rivd., Chicago, Ill.

Ryerson & Son, Jos. T., 16th & Rockwell, Chgo.

Version Allsteel Press Co., 9303 S. Kenwood, Chgo.

Brazers, Electric

Oliver Machinery Co., Grand Rapids, Mich.

Broaches, Spline and Square

Colonial Broach Co., Detroit, Mich.

Illinois Tool Works, 2501 N. Keeler, Chicago

Broaching Machine Tools

Colonial Broach Co., Detroit, Mich.

Broach Sharpening Machines

Colonial Broach Co., Detroit, Mich.

Buffers, Bench

Cincinnati Electrical Tool Co., Cincinnati, O.
Mall Tool Co., 7742 S. Chicago Ave., Chicago, Ill.
Vonnegut Moulder Corp., Indianapolis, Ind.

Buffers, Pedestal

Cincinnati Electrical Tool Co., Cincinnati, Ohio
Vonnegut Moulder Corp., Indianapolis, Ind.

Buildsizers

Besty Mch. & Mfg. Co., Hammond, Ind.

Bushings, Jig

Acme Industrial Co., 210 N. Laflin St., Chicago
Colonial Broach Co., Detroit, Mich.

Bushings, Steel

Acme Industrial Co., 210 N. Laflin St., Chicago
Baumbach Mfg. Co., E. A., 1812 So. Kilbourne

Ave., Chicago, Ill.

Universal Engineering Co., Frankennuth, Mich.

Calipers

Comet Tools, Inc., 39 Union Sq., N. Y. C.

Scherr Co., Geo., 122 Lafayette, N. Y. C.

Cams, Alloy Steel

Morris Collet & Machine Co., Ecorse, Mich.

Cap Screws

Triplex Screw Co., Cleveland, Ohio

Carbide Tool Salvage

Super Tool Co., Detroit, Mich.

Centering Machines

Cushman Wheel Co., 1359 Altgeld St., Chicago

Sundstrand Machine Tool Co., Rockford, Ill.

Centers, Lathe

Modern Machine Corp., Brooklyn, N. Y.

Motor Tool Mfg. Co., Detroit, Mich.

Nielsen, Inc., Lawton, Mich.

Rigid Tool Holder Co., Detroit, Mich.

Victor Mch. Exch., 251 Centre, N. Y. C.

Chains, Silent and Roller

Chicago Gear Works, 440 N. Oakley, Chicago

Cushman Wheel Co., 1359 Altgeld St., Chicag

Chamfering Machines, Automatic

Grant Mfg. & Machine Co., Bridgeport, Conn.

Chrome Plating, Hard

Master Chrome Service, Cleveland, Ohio

Chucking Fingers

Modern Collet & Machine Co., Ecorse, Mich.

Morrison Machine Products Div., Elmira, N. Y.

Chucks, Air

Logansport Machine, Inc., Logansport, Ind.

Tomkins-Johnson Co., Jackson, Mich.

Chucks, Automatic

Procnier Safety Chuck Co., 14 S. Clinton St.

Chicago, Ill.

Chucks, Collet

Erickson Steel Co., Cleveland, Ohio

Hardinge Brothers, Inc., Elmira, N. Y.

Procnier Safety Chuck Co., 14 St. Clinton St.

Chicago, Ill.

Universal Eng. Co., Frankennuth, Mich.

Chucks, Drill and Tap

Chi. Tool & Eng. Co., 8400 So. Chi. Ave., Chgo.

Errington Mech. Labor., Staten Island, N. Y.

Etico Tool Co., 504 Johnson Ave., Brooklyn, N. Y.

Hartford Special Mach'y Co., Hartford, Conn.

Nielsen, Inc., Lawton, Mich.

Procnier Safety Chuck Co., 14 S. Clinton St.

Chicago, Ill.

Scully-Jones & Co., 1905 S. Rockwell St., Chi-

cago, Ill.

Victor Mch. Exch., 251 Centre, N. Y. C.

Chucks, Drill, Keyless

Motor Tool Mfg. Co., Detroit, Mich.

Chucks, Drill, for Screw Machines

Motor Tool Mfg. Co., Detroit, Mich.

Chucks, Lathe

L-V Chuck Co., Toledo, Ohio

Chucks, Magnetic

Brown & Sharpe Mfg. Co., Providence, R. I.

Chucks, Positive Drive

Apex Mch. & Tool Co., Dayton, Ohio

Chucks, Quick Change

Apex Mch. & Tool Co., Dayton, Ohio

Glenzer Company, J. C., Detroit, Mich.

Procnier Safety Chuck Co., 14 So. Clinton St.,

Chicago, Ill.

Chucks, Safety Tapping

Apex Mch. Tool Co., Dayton, Ohio

Chucks, Vertical Float

Apex Mch. Tool Co., Dayton, Ohio

Buyers' Directory

Clamps

Hercules Products, San Francisco, Calif.

Clamps, Toggle, Univ. Action

Knu-Vise Inc., Detroit, Mich.

Clutches, Friction

Conway Clutch Co., Cincinnati, Ohio

Coil Winding Equipment

Ideal Commutator Dresser Co., Sycamore, Ill.

Collets and Feed Fingers

Modern Collet & Machine Co., Ecorse, Mich.

Morrison Machine Products Div., Elmira, N. Y.

Sutton Tool Co., Detroit, Mich.

Collets for all Lathes and Millers

Hardinge Brothers, Inc., Elmira, N. Y.

Modern Collet & Machine Co., Ecorse, Mich.

Sutton Tool Co., Detroit, Mich.

Collet Tubes

Modern Collet & Machine Co., Ecorse, Mich.

Sutton Tool Co., Detroit, Mich.

Compressors

Federal Products Corp., Providence, R. I.

Compressors, Air

Chi. Pneum. Tool Co., 6 E. 44th, N. Y. C.

Contract Work Wanted

Beatty Mch. & Mfg. Co., Hammond, Ind.

Burke Machine Tool Co., Conneaut, Ohio

Coping Machines

Beatty Mch. & Mfg. Co., Hammond, Ind.

Counterbores

Glenzer Company, J. C., Detroit, Mich.

Scully-Jones & Co., 1905 S. Rockwell St., Chicago, Ill.

Threadwell Tap & Die Co., Greenfield, Mass.

Counters

Durant Mfg. Co., Milwaukee, Wis.

Countersinks

Glenzer Company, J. C., Detroit, Mich.

Severance Tool Mfg. Co., Saginaw, Mich.

Couplings, Belt

Armstrong-Bray & Co., 308 N. Loomis, Chicago

Nicholson Co., W. H., Wilkesbarre, Pa.

Couplings, Flexible

Chi. Die Cast. Mfg. Co., 2502 W. Monroe, Chgo.

Couplings, Friction Clutch

Conway Clutch Co., Cincinnati, Ohio

Cranes

Shaw-Box Crane & Hoist Co., 435 Broadway, Muskegon, Mich.

Cut-off Machines

Cincinnati Electrical Tool Co., Cincinnati, Ohio

Cut-off Saws

Oliver Machinery Co., Grand Rapids, Mich.

Tannewitz Works, Grand Rapids, Mich.

Cutter Grinders

Gorton Machine Co., Geo., Racine, Wis.

Oliver Instrument Co., Adrian, Mich.

Cutters

Progressive Tool & Cutter Co., Ferndale, Mich.

Quality Tool Works, Waukegan, Ill.

Tomkins-Johnson Co., Jackson, Mich.

Cutters, Keyway

Threadwell Tap & Die Co., Greenfield, Mass.

Cutters, Midget Milling

Ford Mfg. Co., M. A., Davenport, Iowa

Severance Tool Mfg. Co., Saginaw, Mich.

Cutters, Milling

Brown & Sharpe Mfg. Co., Providence, R. I.

Eastern Cutter Salvage Corp., Newark, N. J.

Illinois Tool Works, 2501 N. Keeler, Chicago

Master Tool Co., Cleveland, Ohio

Reisinger Mfg. Co., Rochester, N. Y.

Renn Tool Company, Detroit, Mich.

Scully-Jones & Co., 1905 S. Rockwell St., Chicago, Ill.

Cutters, Gear

Michigan Tool Co., Detroit, Mich.

Cutters, Taper Roaming

Ford Mfg. Co., M. A., Davenport, Iowa

Severance Tool Mfg. Co., Saginaw, Mich.

Cutters, Tube Burring

Ford Mfg. Co., M. A., Davenport, Iowa

Severance Tool Mfg. Co., Saginaw, Mich.

Cutters, Woodruff

Glenzer Company, J. C., Detroit, Mich.

Cutters and Tools, Cutting

Carboly Co., Detroit, Mich.

Cutting and Notching Mchs.—Angle Iron

Ryerson & Son, Jos. T., 16th & Rockwell, Chgo.

Cylinders, Air

Bell Machine Co., Oshkosh, Wis.

Galland-Henning Mfg. Co., Milwaukee, Wis.

Hanna Engineering Works, 1763 Elston, Chicago

Logansport Machine, Inc., Logansport, Ind.

Tomkins-Johnson Co., Jackson, Mich.

Demagnetizers

Electro-Matic Products Co., 4036 N. Kolmar, Chgo.

Luma Electric Equipment Co., Toledo, Ohio

L-W Chuck Co., Toledo, Ohio

Printz Electric Co., Detroit, Mich.

Victor Machinery Co., 130 S. Clinton St., Chicago, Ill.

Diamonds

Industrial Diamond Co., Detroit, Mich.

Diamond Dressings

Industrial Diamond Co., Detroit, Mich.

Diamond Pointed Tools

Industrial Diamond Co., Detroit, Mich.

Dies

Circle Tip Tool Corp., East Orange, N. J.

Threadwell Tap & Die Co., Greenfield, Mass.

Die Castings

Chi. Die Cast. Mfg. Co., 2502 W. Monroe, Chgo.

Die Duplicating Machines

Gorton Machine Co., Geo., Racine, Wis.

Die Filers

Continental Machine Specialties, Minneapolis

Grob Brothers, Grafton, Wis.

Oliver Instrument Co., Adrian, Mich.

Postel Filing Mch. Co., Minneapolis, Minn.

Die Making Machines

Continental Machine Specialties, Minneapolis

Grob Brothers, Grafton, Wis.

Oliver Instrument Co., Adrian, Mich.

Pratt & Whitney, Hartford, Conn.

Die Makers' Supplies

Cerro de Pasco Copper Corp., 44 Wall St., New York, N. Y.

Darton Rogers Mfg. Co., Minneapolis, Minn.

Dies, Sets

Baumbach Mfg. Co., E. A., 1812 S. Kilbourne Ave., Chicago, Ill.

Danly Mch. Specialties, 2130 So. 52nd, Chgo.

Dies, Blank and Forming

American Tool Works, Inc., Hartford, Conn.

Hamilton Tool Company, Hamilton, Ohio

Quality Hdwe. & Mch. Co., 5943 Ravenswood, Chicago

Dies, Perforating

Whistler & Sons, S. B., Buffalo, N. Y.

Dividing Heads

Wm. Carroll & Son, Norwood, Cincinnati, O.

L-W Chuck Co., Toledo, Ohio

Dowel Pins, Steel

Acme Industrial Co., 210 N. Laflin St., Chicago

Baumbach Mfg. Co., E. A., 1812 S. Kilbourne Ave., Chicago, Ill.

Drawing Instruments

Wade Instrument Co., Cleveland, Ohio.

Dressers, Angle

Vinco Tool Co., Detroit, Mich.

Dressers, Contour Grinding

Brickner-Knopf Mch. Co., Muskegon Heights, Mich.

Dressers, Emery Wheel

Carboly Co., Detroit, Mich.

M & S Dresser, Hartford, Conn.

Dressers, Grinding Wheel

Desmond-Stehan Mfg. Co., Urbana, Ohio

Vincent Steel Process Co., Detroit, Mich.

Dressers, Radius

Vinco Tool Co., Detroit, Mich.

Drill Bushings

Acme Industrial Co., 210 N. Laflin St., Chicago

Universal Eng. Co., Frankenthuth, Mich.

Drill Jigs, Spec. & Univ.

Heuser Mfg. Co., 1638 N. Paulina St., Chicago

Drills, Core

Glenzer Company, J. C., Detroit, Mich.

Buyers' Directory

- Drills, Electric**
Chi. Pneum. Tool Co., 6 E. 44th, N. Y. C.
Cincinnati Electrical Tool Co., Cincinnati, Ohio
Mall Tool Co., 7742 S. Chicago Ave., Chicago, Ill.
Master Tool Co., Cleveland, Ohio
Skilaw, Inc., 3304 Elston Ave., Chicago, Ill.
Speedway Mfg. Co., 1822 S. 52nd, Cicero, Ill.
Stanley Electric Tool Div., New Britain, Conn.
- Drills, Pneumatic**
Chi. Pneum. Tool Co., 6 E. 44th, N. Y. C.
- Drills, Taper Shank**
Victor Mch. Exch., 251 Centre, N. Y. C.
- Drill Grinders**
Black Diamond Saw & Machine Works, Inc., Natick, Mass.
Gallmeyer & Livingston Co., Gr. Rapids, Mich.
Oliver Instrument Co., Adrian, Mich.
Sellers & Co., Wm., Philadelphia, Pa.
Star Electric Motor Co., Bloomfield, N. J.
- Drill Presses**
Walker-Turner Company, Plainfield, N. J.
- Drill Press Heads**
Walker-Turner Company, Plainfield, N. J.
- Drilling Attachments, High Speed**
Dalrae Tools Co., Syracuse, N. Y.
- Drilling Machines, Bench**
Ames Co., B. C., Waltham, Mass.
Ayer Mfg. Co., F. H., Chicago Heights, Ill.
Atlas Press Co., Kalamazoo, Mich.
Buffalo Forge Company, Buffalo, N. Y.
Burke Machine Tool Co., Conneaut, Ohio
Delta Mfg. Co., Milwaukee, Wis.
- Drilling Machines, Multiple Spindle**
Buffalo Forge Company, Buffalo, N. Y.
Canedy-Otto Mfg. Co., Chicago Heights, Ill.
- Drilling Machines, Portable Electric**
Mall Tool Co., 7742 S. Chicago Ave., Chicago, Ill.
Skilaw, Inc., 3304 Elston Ave., Chicago, Ill.
Speedway Mfg. Co., 1822 S. 52nd Ave., Cicero, Ill.
Strand Co., N. A., 5001 N. Wolcott St., Chicago
- Drilling Machines, Post**
Buffalo Forge Company, Buffalo, N. Y.
- Drilling Machines, Sensitive**
Atlas Press Co., Kalamazoo, Mich.
Ayer Mfg. Co., F. H., Chicago Heights, Ill.
Buffalo Forge Company, Buffalo, N. Y.
Burke Machine Tool Co., Conneaut, Ohio
Hamilton Tool Co., Hamilton, Ohio
- Drilling Machines, Vertical**
Atlas Press Co., Kalamazoo, Mich.
Buffalo Forge Company, Buffalo, N. Y.
- Drilling Mchs., Wall Type**
Ayer Mfg. Co., F. H., Chicago Heights, Ill.
- Drives, Lathe**
Berkeley Engineering Co., Cleveland, Ohio
Drive-All Mfg. Co., Detroit, Mich.
Cullman Wheel Co., 1359 Altgeld St., Chicago
Hardinge Brothers, Inc., Elmira, N. Y.
Quality Hdwe. & Mch. Co., 5943 Ravenswood, Chicago
- Drives, Machine Tool**
The Torq Electric Mfg. Co., Cleveland, Ohio
Westof Tool & Mfg. Co., Detroit, Mich.
- Drives, Machine Tool**
Drive-All Mfg. Co., Detroit, Mich.
The Torq Electric Mfg. Co., Cleveland, Ohio
Westof Tool & Mfg. Co., Detroit, Mich.
- Drives, Punch Press**
The Torq Electric Mfg. Co., Cleveland, Ohio
- Drives, Shaper**
Quality Hdwe. & Mch. Co., 5943 Ravenswood, Chicago
- Drives, Turret Lathe**
The Torq Electric Mfg. Co., Cleveland, Ohio
Westof Tool & Mfg. Co., Detroit, Mich.
- Drives, Turret Lathe**
The Torq Electric Mfg. Co., Cleveland, Ohio
- Elevating Tables**
Hamilton Tool Company, Hamilton, Ohio
Midwest Tool & Engineer. Co., Dayton, Ohio
- Emery Wheel Dressers and Cutters**
Western Tool & Mfg. Co., Springfield, Ohio
- End Mills**
Glenzer Company, J. C., Detroit, Mich.
Master Tool Co., Cleveland, Ohio
Progressive Tool & Cutter Co., Ferndale, Mich.
Renu Tool Company, Detroit, Mich.
Victor Mch. Exch., 251 Centre, N. Y. C.
- Engraving Machines**
Gorton Machine Co., Geo., Racine, Wis.
Luma Electric Equipment Co., Toledo, Ohio
Printz Electric Co., Detroit, Mich.
- Exhaust Blowers**
Buffalo Forge Company, Buffalo, N. Y.
- Experimental Work**
American Tool Works, Inc., Hartford, Conn.
- Extractors, Tap**
Walton Co., Hartford, Conn.
- Facers, Spot**
Circle Tip Tool Corp., East Orange, N. J.
Glenzer Company, J. C., Detroit, Mich.
- Feed Fingers for Auto. Screw Machines**
Modern Collet & Machine Co., Ecorse, Mich.
Morrison Machine Products Div., Elmira, N. Y.
Sutton Tool Co., Detroit, Mich.
- Files**
Oliver Instrument Co., Adrian, Mich.
Victor Mch. Exch., 251 Centre, N. Y. C.
- Files, Rotary**
Ford Mfg. Co., M. A., Davenport, Iowa
Grobet File Corp. of America, 3 Park Place, New York, N. Y.
Hamilton Tool Company, Hamilton, Ohio
Pratt & Whitney Div., Hartford, Conn.
Severance Tool Mfg. Co., Saginaw, Mich.
- Filing Machines**
Continental Machine Specialties, Minneapolis
Grob Brothers, Grafton, Wis.
Mall Tool Co., 7742 S. Chicago Ave., Chicago, Ill.
Oliver Instrument Co., Adrian, Mich.
- Filing Room Equipment**
Wardwell Manufacturing Co., Cleveland, Ohio
- Fixtures**
Knu-Vise, Inc., Detroit, Mich.
- Flexible Shafts and Accessories**
Haskins Co., R. G., 623 S. California, Chicago
Mall Tool Co., 7742 S. Chicago Ave., Chicago, Ill.
Stow Mfg. Company, Binghamton, N. Y.
Strand & Co., 5001 N. Wolcott, Chicago
Walker-Turner Company, Plainfield, N. J.
Wyzenbeek & Staff, Inc., 838 W. Hubbard, Chgo.
- Flexible Shaft Machinery**
Haskins Co., R. G., 623 S. California, Chicago
Mall Tool Co., 7742 S. Chicago Ave., Chicago, Ill.
Pratt & Whitney, Hartford, Conn.
Strand & Co., 5001 N. Wolcott, Chicago
Wyzenbeek & Staff, Inc., 838 W. Hubbard, Chgo.
- Floating Holders**
Glenzer Company, J. C., Detroit, Mich.
- Floating Holders, Parallel Float**
Apex Mch. & Tool Co., Dayton, Ohio
- Floating Holders, Parallel & Rad.**
Apex Mch. & Tool Co., Dayton, Ohio
- Flue Lathes**
Marshalltown Mfg. Co., Marshalltown, Ia.
- Flue Welders**
Marshalltown Mfg. Co., Marshalltown, Ia.
- Forming Tools**
Circle Tip Tool Corp., East Orange, N. J.
Michigan Tool Co., Detroit, Mich.
Morrison Machine Products Div., Elmira, N. Y.
- Furniture, Machine Shop**
Standard Pressed Steel Co., Jenkintown, Pa.
Western Tool & Mfg. Co., Springfield, Ohio
- Gages**
Ames Co., B. C., Waltham, Mass.
Federal Products Corp., Providence, R. I.
Hammond Mch. Builders, Kalamazoo, Mich.
Vince Tool Co., Detroit, Mich.
- Gages, Pin, Plug, Ring and Snap**
American Tool Works, Inc., Hartford, Conn.
- Gages, Pressure**
Marshalltown Mfg. Co., Marshalltown, Ia.
- Gages, Spring Stock**
Knu-Vise, Inc., Detroit, Mich.
- Gages, Taper**
Hartford Special Machinery Co., Hartford, Conn.

Buyers' Directory

Gears

Abart Gear & Mehe. Co., 4832 W. 16th St., Chgo.
Chicago Gear Works, 440 N. Oakley, Chicago

Generators, Motor

Chicago Elec. Co., 1330 W. Cermak Rd., Chgo.
Lincoln Electric Co., Cleveland, Ohio
Star Electric Motor Co., Bloomfield, N. J.

Grinders, Bench

Baldor Electric Co., St. Louis, Mo.
Cincinnati Electrical Tool Co., Cincinnati, Ohio
Mall Tool Co., 7742 S. Chicago Ave., Chicago, Ill.
Stanley Electric Tool Div., New Britain, Conn.
Vonnegut Moulder Corp., Indianapolis, Ind.
Walker-Turner Company, Plainfield, N. J.

Grinders, Disc

Cincinnati Electrical Tool Co., Cincinnati, Ohio
Gaston Power Tools Co., Evergreen Park, Ill.
Mall Tool Co., 7742 S. Chicago Ave., Chicago, Ill.
Oliver Machinery Co., Grand Rapids, Mich.
Wyzenbeek & Staff, Inc., 838 W. Hubbard, Chgo.

Grinders, Flexible Shaft

Haskins Co., R. G., 623 S. California, Chicago
Mall Tool Co., 7742 S. Chicago Ave., Chicago, Ill.
Stanley Electric Tool Div., New Britain, Conn.
N. A. Strand & Co., 5001 N. Wolcott, Chicago

Grinders, Hand

Chicago Wheel & Mfg. Co., 1101 W. Monroe St., Chicago, Ill.
Cincinnati Electrical Tool Co., Cincinnati, Ohio
Dremel Mfg. Co., Racine, Wis.
Dumore Co., Racine, Wis.
Duro Metal Products Co., 2651 N. Kildare Ave., Chicago, Ill.
Mall Tool Co., 7742 S. Chicago Ave., Chicago, Ill.
Skilsaw, Inc., 3304 Elston Ave., Chicago, Ill.

Grinders, Heavy Duty

Cincinnati Electrical Tool Co., Cincinnati, Ohio
Vonnegut Moulder Corp., Indianapolis, Ind.

Grinders, High Speed

Bridgeport Machines, Inc., Bridgeport, Conn.
Chicago Wheel & Mfg. Co., 1101 W. Monroe St., Chicago, Ill.
Dremel Mfg. Co., Racine, Wis.
Mall Tool Co., 7742 S. Chicago Ave., Chicago, Ill.

Grinders, Internal

Chi. Tool & Eng. Co., 8400 So. Chi. Ave., Chgo.

Grinders, Pedestal Electric

Baldor Electric Co., St. Louis, Mo.
Cincinnati Electrical Tool Co., Cincinnati, Ohio

Grinders, Precision

Dumore Co., Racine, Wis.

Grinders, Production Surface

Bergam Mech. Eng. Co., New Britain, Conn.
Gallmeyer & Livingston Co., Gr. Rapids, Mich.

Grinders, Snagging

Cincinnati Electrical Tool Co., Cincinnati, Ohio

Grinders, Surface, Auto. Feed

Gallmeyer & Livingston Co., Gr. Rapids, Mich.
Reid Brothers Co., Beverly, Mass.

Grinders, Swing Frame

Vonnegut Moulder Corp., Indianapolis, Ind.

Grinders, Utility

Bergam Mech. Eng. Co., New Britain, Conn.

Grinders, Univ. Tools & Cutter

LeBlond Mch. Tool Co., R. K., Cincinnati, Ohio

Grinding Attachments, Drill

Atlas Press Co., Kalamazoo, Mich.
Carlson Mfg. Co., C. H., Minneapolis, Minn.
Mall Tool Co., 7742 S. Chicago Ave., Chicago, Ill.
Oliver Instrument Co., Adrian, Mich.

Grinding, Centerless (Contract)

Eastern Centerless Grind. Co., Hartford, Conn.
Helm Company, Fairfield, Conn.

Grinding Machines, Belt

Armco Co., Milwaukee, Wis.

Walls Sales Corp.

96 Warren St., New York

Grinding Machines, Cutter, Reamer and Tool

Brown & Sharpe Mfg. Co., Providence, R. I.
Gallmeyer & Livingston Co., Gr. Rapids, Mich.
Lee & Son, K. O., Aberdeen, S. Dak.
National Machine Tool Co., Racine, Wis.
Oliver Instrument Co., Adrian, Mich.

Grinding Machines, Portable Electric

Chi. Pneum. Tool Co., 6 E. 44th, N. Y. C.
Chi. Tool & Eng. Co., 8400 So. Chi. Ave., Chgo.
Chicago Wheel & Mfg. Co., 1101 W. Monroe St., Chicago, Ill.
Dremel Mfg. Co., Racine, Wis.
Duro Metal Products Co., 2651 N. Kildare Ave., Chicago, Ill.
Haskins Co., R. G., 623 S. California, Chicago
Mall Tool Co., 7742 S. Chicago Ave., Chicago, Ill.
National Machine Tool Co., Racine, Wis.
Pratt & Whitney, Hartford, Conn.
Stow Mfg. Company, Binghamton, N. Y.
Strand Co., N. A., 5001 N. Wolcott St., Chicago
Grinding Mchs., Port. Pneumatic
Chi. Pneum. Tool Co., 6 E. 44th, N. Y. C.

Grinding Wheels

Chicago Wheel & Mfg. Co., 1101 W. Monroe St., Chicago, Ill.
Mall Tool Co., 7742 S. Chicago Ave., Chicago, Ill.

Hack Saw Blades

Armstrong-Blum Mfg. Co., 5741 Bloomingdale Ave., Chicago, Ill.
Racine Tool & Mch. Co., Racine, Wis.
Victor Mch. Exch., 251 Centre, N. Y. C.

Hack Saw Machines

Armstrong-Blum Mfg. Co., 5741 Bloomingdale Ave., Chicago, Ill.

L-W Chuck Co., Toledo, Ohio

Racine Tool & Mch. Co., Racine, Wis.

Hammers, Chipping

Chi. Pneum. Tool Co., 6 E. 44th, N. Y. C.
Master Tool Co., Cleveland, Ohio

Hammers, Portable Electric

Chi. Pneum. Tool Co., 6 E. 44th, N. Y. C.
Stanley Electric Tool Div., New Britain, Conn.

Hammers, Riveting

Chi. Pneum. Tool Co., 6 E. 44th, N. Y. C.

Hand Saws, Portable Electric

Skilsaw, Inc., 3304 Elston Ave., Chicago, Ill.

Hand Screw Machine Live Centers

Motor Tool Mfg. Co., Detroit, Mich.

Hand Screw Machines, Precision

Hardinge Brothers, Inc., Elmira, N. Y.

Handpieces, Reciprocating

Stow Mfg. Company, Binghamton, N. Y.

Heads, Boring

Flynn Manufacturing Co., Detroit, Mich.

Heat Treating

Vincent Steel Process Co., Detroit, Mich.

Hinges, Continuous Steel

Auto Moulding & Mfg. Co., 2326 S. Canal, Chgo.

Hinges, Plain and Offset

Auto Moulding & Mfg. Co., 2326 S. Canal, Chgo.

Hobs

Illinois Tool Works, 2501 N. Keeler, Chicago

Michigan Tool Co., Detroit, Mich.

Hoists, Chain—Bought and Sold

Logeman, T. V., Normandy (St. Louis Co.), Mo.

Hoists, Chain—Serviced

Logeman, T. V., Normandy (St. Louis Co.), Mo.

Hoists, Electric

Shaw-Box Crane & Hoist Co., 435 Broadway, Muskegon, Mich.

Index Centers

Brown & Sharpe Mfg. Co., Providence, R. I.

Wm. Carroll & Son, Norwood, Cincinnati, Ohio

L-W Chuck Co., Toledo, Ohio

Indicators, Dial

Federal Products Corp., Providence, R. I.

Indicators, Surface Test

Federal Products Corp., Providence, R. I.

Jigs and Fixtures

American Tool Works, Inc., Hartford, Conn.

Hamilton Tool Company, Hamilton, Ohio

Hartford Special Machinery Co., Hartford, Conn.

Joints, Universal

Apex Machine Co., Dayton, Ohio

Borreson Mfg. Co., Torrington, Conn.

Keystating Machines

Burr & Son, John T., Brooklyn, N. Y.

Lacings, Belt

Armstrong-Bray & Co., 308 N. Loomis, Chicago

Lathe Live Centers

Modern Machine Corp., Brooklyn, N. Y.

Motor Tool Mfg. Co., Detroit, Mich.

Buyers' Directory

Lathe Drives
Cullman Wheel Co., 1359 Altgeld St., Chicago
Hardinge Brothers, Inc., Elmira, N. Y.

Lathes, Automatic
LeBlond Mch. Tool Co., R. K., Cincinnati, Ohio
Lipe, Inc., W. C., Syracuse, N. Y.

Lathes, Back Geared
Atlas Press Co., Kalamazoo, Mich.
Rivett Lathe & Grinder, Inc., Brighton, Boston
South Bend Lathe Works, South Bend, Ind.

Lathes, Bench
Ames Co., B. C., Waltham, Mass.
Atlas Press Co., Kalamazoo, Mich.
Delta Mfg. Co., Milwaukee, Wis.
Hardinge Brothers, Inc., Elmira, N. Y.
Rivett Lathe & Grinder, Inc., Brighton, Boston
Sheldon Mch. Co., 1629 N. Kilbourn Ave., Chicago
South Bend Lathe Works, South Bend, Ind.
Wade Tool Co., Waltham, Mass.

Lathes, Deep Hole Boring
LeBlond Mch. Tool Co., R. K., Cincinnati, Ohio
Lathes, Engine
LeBlond Mch. Tool Co., R. K., Cincinnati, Ohio
South Bend Lathe Works, South Bend, Ind.

Lathes, Gap
LeBlond Mch. Tool Co., R. K., Cincinnati, Ohio

Lathes, Hollow Spindle
LeBlond Mch. Tool Co., R. K., Cincinnati, Ohio

Lathes, Hydraulic
Lipe, Inc., W. C., Syracuse, N. Y.

Lathes, Manufacturing
Sundstrand Machine Tool Co., Rockford, Ill.

Lathes, Multicut
LeBlond Mch. Tool Co., R. K., Cincinnati, Ohio

Lathes, Polishing & Buffing
Cincinnati Electrical Tool Co., Cincinnati, Ohio
Hardinge Brothers, Inc., Elmira, N. Y.

Lathes, Precision
South Bend Lathe Works, South Bend, Ind.

Lathes, Precision Bench
Atlas Press Co., Kalamazoo, Mich.
Hardinge Brothers, Inc., Elmira, N. Y.
South Bend Lathe Works, South Bend, Ind.

Lathes, Screw Cutting
Atlas Press Co., Kalamazoo, Mich.
Hardinge Brothers, Inc., Elmira, N. Y.
South Bend Lathe Works, South Bend, Ind.
Wade Tool Co., Waltham, Mass.

Lathes, Speed
Schaner Machine Co., Cincinnati, Ohio

Lathes, Toolroom
Atlas Press Co., Kalamazoo, Mich.
Hardinge Brothers, Inc., Elmira, N. Y.
LeBlond Mch. Tool Co., R. K., Cincinnati, Ohio
South Bend Lathe Works, South Bend, Ind.

Layout Tables
Busch Co., J. C., Milwaukee, Wis.

Leaders Pins, Steel
Acme Industrial Co., 210 Laflin St., Chicago, Ill.

Leather Oil Retainers
Gits Bros. Mfg. Co., 1860 S. Kilbourn, Chicago

Length Standards
Scherr Co., Geo., 122 Lafayette, N. Y. C.

Lights, Elec. Movable
Zagora Mch. & Gear Co., J., Charlotte, N. C.

Lights, Shop
Chl. Die Cast, Mfg. Co., 2502 W. Monroe, Chicago
Vimco Mfg. Co., Buffalo, N. Y.

Live Lathe Centers
Zagora Mch. & Gear Co., J., Charlotte, N. C.

Lubricators, Air
Glenzer Company, J. C., Detroit, Mich.
Modern Machine Corp., Brooklyn, N. Y.

Lubricators, Automatic
Motor Tool Mfg. Co., Detroit, Mich.

Lubricators, Manual
Norgren Co., C. A., Denver, Colorado

Lubricating Devices
Norgren Co., C. A., Denver, Colorado

Magnetic Chuck Demagnetizers
Essex Brass Corp., Detroit, Mich.

Electro-Matic Products Co., 4036 N. Kolmar, Chgo.

Mandrels
Lee & Son Co., K. O., Aberdeen, S. Dak.

Mandrels, Expanding
Nicholson Co., W. H., Wilkesbarre, Pa.

Western Tool & Mfg. Co., Springfield, Ohio

Marking Machines
Bates, H. O., Elizabeth, N. J.

Ideal Commutator Dresser Co., Sycamore, Ill.

New Method Steel Stamp, Inc., Detroit, Mich.

Schmidt, Geo. T., Inc., 1802 Belle Plaine Ave., Chicago, Ill.

Meters, Air Velocity
Ill. Testing Lab., 150 W. Austin, Chicago.

Milling Attachments
Bridgeport Machines, Inc., Bridgeport, Conn.

Burke Machine Tool Co., Conneaut, Ohio

Wm. Carroll & Son, Norwood, Cincinnati, Ohio

Dalrae Tools Co., Syracuse, N. Y.

Kearney & Trecker Corp., Milwaukee, Wis.

Milling Cutters
Master Tool Co., Cleveland, Ohio

Victor Mch. Exch., 251 Centre, N. Y. C.

Milling Machine Live Centers
Motor Tool Mfg. Co., Detroit, Mich.

Milling Machines, Bench
Burke Machine Tool Co., Conneaut, Ohio

Hardinge Brothers, Inc., Elmira, N. Y.

Sundstrand Machine Tool Co., Rockford, Ill.

Milling Machines, Hand
Burke Machine Tool Co., Conneaut, Ohio

Sundstrand Machine Tool Co., Rockford, Ill.

Milling Machines, Plain
Burke Machine Tool Co., Conneaut, Ohio

Kearney & Trecker Corp., Milwaukee, Wis.

Sundstrand Machine Tool Co., Rockford, Ill.

Milling Machines, Universal
Brown & Sharpe Mfg. Co., Providence, R. I.

Gorton Machine Co., Geo., Racine, Wis.

Kearney & Trecker Corp., Milwaukee, Wis.

Mills, Hollow
Reisinger Mfg. Co., Rochester, N. Y.

Motors, Electric
Dremel Mfg. Co., Racine, Wis.

Lincoln Electric Co., Cleveland, Ohio

Star Electric Motor Co., Bloomfield, N. J.

Motors, Elec. Internal Brakes
Star Electric Motor Co., Bloomfield, N. J.

Motor Drives, Universal
Berkeley Engineering Co., Cleveland, Ohio

Cullman Wheel Co., 1359 Altgeld St., Chicago

Quality Hdwe. & Mch. Co., 5943 Ravenswood, Chicago

Steegs Mch. Co., W. L., 548 W. Monroe, Chgo.

Turner Unit-Drive Co., Kansas City, Mo.

Motor Units, Worm Gear
Star Electric Motor Co., Bloomfield, N. J.

Moulds & Ladies, Hammer and Vise
Johnson Tool Co., East Providence, R. I.

Multiple Oilers
Gits Bros. Mfg. Co., 1860 S. Kilbourn, Chicago

Nails
Hassall, Inc., John, Brooklyn, N. Y.

Name Plates
Bates, H. O., Elizabeth, N. J.

Nibbling Machines
Libert Machine Co., Green Bay, Wis.

Nut Setters
National Machine Tool Co., Racine, Wis.

Oil Cups
Cincinnati Electrical Tool Co., Cincinnati, Ohio

Oil Gauges
Gits Bros. Mfg. Co., 1860 S. Kilbourn, Chicago

Oil and Grease Seals
Gits Bros. Mfg. Co., 1860 S. Kilbourn, Chicago

Oilers, Automatic
Trico Fuse Mfg. Co., Milwaukee, Wis.

Pins, Leader and Dowel
Acme Industrial Co., 210 N. Laflin St., Chicago

Pipe Threading Machines
Baumbach Mfg. Co., E. A., 1812 S. Kilbourne Ave., Chicago, Ill.

Pliers, Toggle
Knu-Vise, Inc., Detroit, Mich.

Point Thinning Machines
Oliver Instrument Co., Adrian, Mich.

Buyers' Directory

Power Devices, Air-hydraulic

Logansport Machine, Inc., Logansport, Ind.

Press Brakes

Dreis & Krump Mfg. Co., 7440 Loomis Blvd., Chicago, Ill.

Verson Allsteel Press Co., 9303 So. Kenwood, Chi.

Press Feeds

Littell Machine Co., F. J., 4153 Ravenswood Ave., Chicago, Ill.

Rockford Iron Works, Rockford, Ill.

Wittek Mfg. Co., 4309 W. 24th Place, Chicago

Presses, Arbor

Atlas Press Co., Kalamazoo, Mich.

Famco Machine Co., Racine, Wis.

Greenard Arbor Press Co., Nashua, N. H.

Hanna Engineering Works, 1763 Elston, Chicago

Nicholson Co., W. H., Wilkesbarre, Pa.

Sheldon Mch. Co., 1629 N. Kilbourn, Chicago

Tomkins-Johnson Co., Jackson, Mich.

Wilson, K. R., Buffalo, N. Y.

Presses, Bench

Atlas Press Co., Kalamazoo, Mich.

Famco Machine Co., Racine, Wis.

Greenard Arbor Press Co., Nashua, N. H.

Loshbough-Jordan Tool & Mch. Co., Elkhart, Ind.

Rockford Iron Works, Rockford, Ill.

Presses, Broaching

Greenard Arbor Press Co., Nashua, N. H.

Presses, Foot

Famco Machine Co., Racine, Wis.

Rockford Iron Works, Rockford, Ill.

Presses, Forming

Marshalltown Mfg. Co., Marshalltown, Ia.

Presses, Hydraulic

Atlas Press Co., Kalamazoo, Mich.

Beatty Mch. & Mfg. Co., Hammond, Ind.

Greenard Arbor Press Co., Nashua, N. H.

Presses, Inclined

Federal Press Co., Elkhart, Ind.

Loshbough-Jordan Tool & Mch. Co., Elkhart, Ind.

Marshalltown Mfg. Co., Marshalltown, Ia.

Rockford Iron Works, Rockford, Ill.

Ross Co., David J., Benton Harbor, Mich.

Presses, Power

Dreis & Krump Mfg. Co., 7440 Loomis Blvd., Chicago, Ill.

Federal Press Co., Elkhart, Ind.

Loshbough-Jordan Tool & Mch. Co., Elkhart, Ind.

Rockford Iron Works, Rockford, Ill.

Ryerson & Son, Jos. T., 16th & Rockwell, Chgo.

Verson Allsteel Press Co., 9303 So. Kenwood, Chi.

Presses, Punch

Dreis & Krump Mfg. Co., 7440 Loomis Blvd., Chicago, Ill.

Lewthwaite Machine Co., 311 E. 47th St., New York, N. Y.

Loshbough-Jordan Tool & Mch. Co., Elkhart, Ind.

Marshalltown Mfg. Co., Marshalltown, Ia.

Rockford Iron Works, Rockford, Ill.

Ross Co., David J., Benton Harbor, Mich.

Presses, Sheet Metal

Federal Press Co., Elkhart, Ind.

Loshbough-Jordan Tool & Mch. Co., Elkhart, Ind.

Profiling Machines

Gorton Machine Co., Geo., Racine, Wis.

Oliver Instrument Co., Adrian, Mich.

Wade Tool Co., Waltham, Mass.

Pulleys, Die Cast

Chi. Die Cast Mfg. Co., 2502 W. Monroe, Chgo.

Pulleys, Steel and Wood

Delta Mfg. Co., Milwaukee, Wis.

Pumps

Brown & Sharpe Mfg. Co., Providence, R. I.

Galland-Henning Mfg. Co., Milwaukee, Wis.

Pumps, Centrifugal

Logansport Machine, Inc., Logansport, Ind.

Pumps, Coolant

Ruthman Machinery Co., Cincinnati, Ohio

Tomkins-Johnson Co., Jackson, Mich.

Pumps, Lubricant

Ruthman Machinery Co., Cincinnati, Ohio

Punch, Shear and Bender, Hand

Armstrong-Blum Mfg. Co., 5741 Bloomingdal Ave., Chicago, Ill.

Buffalo Forge Co., Buffalo, N. Y.

Punch Press Guards

Ross Co., David J., Benton Harbor, Mich.

Punches and Dies

Lewthwaite Machine Co., 311 E. 47th St., New York, N. Y.

Punches, Hand

Armstrong-Blum Mfg. Co., 5741 Bloomingdale Ave., Chicago, Ill.

Buffalo Forge Company, Buffalo, N. Y.

Lewthwaite Machine Co., 311 E. 47th St., New York, N. Y.

Whitney Metal Tool Co., Rockford, Ill.

Punches, Hand and Power

Beatty Mch. & Mfg. Co., Hammond, Ind.

Ryerson & Son, Jos. T., 16th & Rockwell, Chgo.

Punches, Piercing

Durable Punch & Die Co., 711 W. Lake, Chicago

Punches, Transfer

McMahon Co., Frank, Dayton, Ohio

Punches and Shears, Comb.

Ryerson & Son, Jos. T., 16th & Rockwell, Chgo.

Pyrometers

Ill. Test Laboratories, 150 W. Austin, Chicago

Pyrometer Instrument Co., 102 Lafayette, N. Y. C.

Pyrometers, Optical

Pyrometer Instrument Co., 102 Lafayette, N. Y. C.

Pyrometers, Portable and Stationary

Pyrometer Instrument Co., 102 Lafayette, N. Y. C.

Racks, Bar Stock

Western Tool & Mfg. Co., Springfield, Ohio

Wm. S. Yohe Supply Co., Canton, Ohio

Reamers

Glenzer Company, J. C., Detroit, Mich.

Master Tool Co., Cleveland, Ohio

Rens. Tool Company, Detroit, Mich.

Rivets

Hessell, Inc., John, Brooklyn, N. Y.

Rivets, Tubular and Split

Chicago Rivet & Machine Co., 1855 S. 54th St., Cicero, P. O. Chicago, Ill.

Riveters, Automatic Feed

Chicago Rivet & Machine Co., 1855 S. 54th St., Cicero, P. O. Chicago, Ill.

Tomkins-Johnson Co., Jackson, Mich.

Riveters, Multiple Spindle

Grant Mfg. & Machine Co., Bridgeport, Conn.

Riveters, Pneumatic

Chi. Pneum. Tool Co., 6 E. 44th, N. Y. C.

Grant Mfg. & Machine Co., Bridgeport, Conn.

Hanna Engineering Works, 1763 Elston Ave., Chicago, Ill.

Riveting Machines

Buffalo Forge Company, Buffalo, N. Y.

Grant Mfg. & Machine Co., Bridgeport, Conn.

Hanna Engineering Works, 1763 Elston Ave., Chicago, Ill.

Riveting Machines, Tubular and Split

Chicago Rivet & Machine Co., 1855 S. 54th St., Cicero, P. O. Chicago, Ill.

Rod Cutters

Armstrong-Blum Mfg. Co., 5741 Bloomingdale Ave., Chicago, Ill.

Lewthwaite Machine Co., 311 E. 47th St., New York, N. Y.

Rotary Tables

Troyke, Alfred A., Cincinnati, Ohio

Sanders

Chi. Pneum. Tool Co., 6 E. 44th, N. Y. C.

Mail Tool Co., 7742 S. Chicago Ave., Chicago, Ill.

Stanley Electric Tool Div., New Britain, Conn.

Sterling Products Co., Detroit, Mich.

Stow Mfg. Company, Binghamton, N. Y.

Sanders, Disc

Gaston Power Tools Co., Evergreen Park, Ill.

Saws

Black Diamond Saw & Machine Works, Inc., Natick, Mass.

Saws, Electric Hand

Delta Mfg. Co., Milwaukee, Wis.

Mail Tool Co., 7742 S. Chicago Ave., Chicago, Ill.

Stanley Electric Tool Div., New Britain, Conn.

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Buyers' Directory

Saws, Metal Cutting

Racine Tool & Mch. Co., Racine, Wis.
Ryerson & Son, Jos. T., 16th & Rockwell, Chgo.

Saws, Rotary Hack

Stanley Electric Tool Div., New Britain, Conn.

Saw Sharpening Machines

Wardwell Manufacturing Co., Cleveland, Ohio

Sawing Machines

Continental Machine Specialties, Minneapolis
Delta Mfg. Co., Milwaukee, Wis.
Wells Mfg. Corp., Three Rivers, Mich.

Scraping Machines, Hand & Pneumatic

Anderson Bros. Mfg. Co., Rockford, Ill.

Screw Drivers, Electric

Chl. Pneum. Tool Co., 6 E. 44th, N. Y. C.
Cincinnati Electrical Tool Co., Cincinnati, Ohio
Haskins Co., R. G., 623 S. California, Chicago
Stanley Electric Tool Div., New Britain, Conn.
Stow Mfg. Company, Binghamton, N. Y.

Screw Drivers, Hand (Phillips)

Apex Mch. & Tool Co., Dayton, Ohio

Screw Driver Bits (Phillips & slotted screws)

Apex Mch. & Tool Co., Dayton, Ohio

Screw Machine Parts

Modern Collet & Machine Co., Ecorse, Mich.
Sutton Tool Company, Detroit, Mich.

Screw Machine Products

Economy Machine Products Co., 5207 Lawrence Ave., Chicago, Ill.

Screw Machines, Automatic

Brown & Sharpe Mfg. Co., Providence, R. I.

Screwplates

Threadwell Tap & Die Co., Greenfield, Mass.

Screws

Hassall, Inc., John, Brooklyn, N. Y.

Set Screws, Headless and Hollow

Economy Machine Products Co., 5207 Lawrence Chicago, Ill.
Safety Socket Screw Corp., 4440 N. Knox Ave., Chicago, Ill.
Standard Pressed Steel Co., Jenkintown, Pa.
Triplex Screw Co., Cleveland, Ohio

Shafts, Flexible

Haskins Co., R. G., 623 S. California, Chicago
Mall Tool Co., 7742 S. Chicago Ave., Chicago, Ill.
Pratt & Whitney, Hartford, Conn.
Stow Mfg. Company, Binghamton, N. Y.
Strand Co., N. A., 5001 N. Wolcott St., Chicago

Shafts, Hangers & Boxes

Delta Mfg. Co., Milwaukee, Wis.

Shapers

Atlas Press Co., Kalamazoo, Mich.

Shears, Bevel

Marshalltown Mfg. Co., Marshalltown, Ia.

Shears, Hand

Armstrong-Blum Mfg. Co., 5741 Bloomingdale Ave., Chicago, Ill.
Beverly Shear Co., 3007 W. 110th Pl., Chicago
Lewthwaite Machine Co., 311 E. 47th St., New York, N. Y.
National Machine Tool Co., Racine, Wis.
Whitney Metal Tool Co., Rockford, Ill.

Shears, Power

Reatty Mch. & Mfg. Co., Hammond, Ind.
Buffalo Forge Company, Buffalo, N. Y.
Dreis & Krump Mfg. Co., 7440 Loomis, Chicago
Libert Machine Co., Green Bay, Wis.
Ryerson & Son, Jos. T., 16th & Rockwell, Chgo.
Stanley Electric Tool Div., New Britain, Conn.

Shears, Slitting

Beverly Shear Co., 3007 W. 110th Pl., Chicago
Buffalo Forge Co., Buffalo, N. Y.
Dreis & Krump Mfg. Co., 7440 Loomis Chicago
National Machine Tool Co., Racine, Wis.

Shears, Splitting

Marshalltown Mfg. Co., Marshalltown, Ia.

Shears, Throatless

Beverly Shear Co., 3007 W. 110th Pl., Chicago
Marshalltown Mfg. Co., Marshalltown, Ia.
Ryerson & Son, Jos. T., 16th & Rockwell, Chgo.

Sheet Metal Machinery

Libert Machine Co., Green Bay, Wis.

Sieves

Glenzer Company, J. C., Detroit, Mich.

Sleeves, Intermeshing

Durable Punch & Die Co., 711 W. Lake, Chicago

Socket Head Cap Screws

Economy Machine Products Co., 5207 Lawrence Ave., Chicago, Ill.
Safety Socket Screw Corp., 4440 N. Knox Ave., Chicago, Ill.
Standard Pressed Steel Co., Jenkintown, Pa.

Spacing Collars

Scully-Jones & Co., 1905 S. Rockwell St., Chicago, Ill.

Special Tools and Machinery

American Tool Works, Inc., Hartford, Conn.
Reatty Mch. & Mfg. Co., Hammond, Ind.
Quality Hdwe. & Mch. Co., 5943 Ravenswood, Chicago

Speed Reducers

Abart Gear & Mch. Co., 4832 W. 16th St., Chgo.
Chicago Gear Works., 440 N. Oak St., Chicago
Cullman Wheel Co., 1359 Altgeld St., Chicago

Speed Saws, Universal

Wyzenbeek & Staff, Inc., 838 W. Hubbard, Chgo.

Split Rivets

Chicago Rivet & Machine Co., 1855 S. 54th St., Cicero, P. O. Chicago, Ill.

Split Rivet Setters, Automatic Feed

Chicago Rivet & Machine Co., 1855 S. 54th St., Cicero, P. O. Chicago, Ill.

Spools & Nuts for Auto. Screw Machines

Sutton Tool Co., Detroit, Mich.

Spot Welding Machines, Speed

Interstate Machinery Co., Chicago, Ill.

Sprockets

Cullman Wheel Co., 1359 Altgeld St., Chicago

Stake Riveters

Marshalltown Mfg. Co., Marshalltown, Ia.

Stampings

Hamilton Tool Company, Hamilton, Ohio

Southern Products, Independence, Mo.

Stamps, Steel

Rates, H. O., Elizabeth, N. J.
Colonial Broach Co., Detroit, Mich.
New Method Steel Stamp, Inc., Detroit, Mich.

Steel

Ryerson & Son, Jos. T., 16th & Rockwell, Chgo.

Stools, Shop

Standard Pressed Steel Co., Jenkintown, Pa.

Storage Racks

Stackbln Corp., Providence, R. I.

Yoh Supply Co., Canton, Ohio

Straightening Machines

Whitney Metal Tool Co., Rockford, Ill.

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Buyers' Directory

Structural Shop Machinery
Ryerson & Son, Jos. T., 16th & Rockwell, Chgo.

Stud Setters
Apex Machine Co., Dayton, Ohio

Studs, Milled
Safety Socket Screw Corp., 4440 N. Knox Ave., Chicago, Ill.

Surfaces, Wearing
Circle Tip Tool Corp., East Orange, N. J.

Tables, Elevating
Midwest Tool & Engineering Co., Dayton, Ohio

Tables, Spacing
Beatty Mch. & Mfg. Co., Hammond, Ind.

Taps
Threadwell Tap & Die Co., Greenfield, Mass.

Tap Extractors
Walton Co., Hartford, Conn.

Tap Holders
Procnrler Safety Chuck Co., 14 S. Clinton St., Chicago, Ill.
Scully-Jones & Co., 1905 S. Rockwell St., Chicago, Ill.

Tappers, Electric Portable
Chl. Pneum. Tool Co., 6 E. 44th, N. Y. C.
Cincinnati Electrical Tool Co., Cincinnati, Ohio

Tapping Jigs, Univ.
Heuser Mfg. Co., 1638 N. Paulina, Chicago

Tapping Machines and Attachments
Burke Machine Tool Co., Conneaut, Ohio
Errington Mechanical Laboratories, Staten Island, N. Y.

Etico Tool Co., 504 Johnson Ave., Brooklyn, N. Y.
Haskins Co., R. G., 623 S. California, Chicago.
Procnrler Safety Chuck Co., 14 S. Clinton St., Chicago, Ill.
Whitney Metal Tool Co., Rockford, Ill.

Thermometers, Resistance Type
Ill. Test. Lab., 150 W. Austin, Chicago

Threading Machines, Automatic
Grant Mfg. & Machine Co., Bridgeport, Conn.

Threading Tools
Armstrong Bros. Tool Co., 308 N. Francisco Ave., Chicago, Ill.
Rivett Lathe & Grinder, Inc., Brighton, Boston

Tool Holders
Armstrong Bros. Tool Co., 308 N. Francisco Ave., Chicago, Ill.
Michigan Tool Co., Detroit, Mich.
Western Tool & Mfg. Co., Springfield, Ohio

Tool Post Grinders
Cincinnati Electrical Tool Co., Cincinnati, Ohio

Tool Post Turrets
Colwell, S. G., Providence, R. I.

Tool Reclaim. & Salvage
Eastern Cutter Salvage Corp., Newark, N. J.
Master Tool Co., Cleveland, Ohio
Renu Tool Company, Detroit, Mich.

Tools, Boring
Armstrong Bros. Tool Co., 308 N. Francisco Ave., Chicago, Ill.
Comet Tools, Inc., 39 Union Sq., N. Y. C.

Tools, Carbide Tipped
Super Tool Co., Detroit, Mich.

Tools, Cutting
Circle Tip Tool Corp., East Orange, N. J.

Tools, Diamond Wheel Dressing
Super Tool Co., Detroit, Mich.

Tools, Lathe and Planer
Armstrong Bros. Tool Co., 308 N. Francisco Ave., Chicago, Ill.

Tools, Machinists'
Armstrong Bros. Tool Co., 308 N. Francisco Ave., Chicago, Ill.
Brown & Sharpe Mfg. Co., Providence, R. I.

Tools, Pneumatic and Main Parts
Eastern Cutter Salvage Corp., Newark, N. J.
Master Tool Co., Cleveland, Ohio

Torch, Pumpless Gasoline
National Safety Device Co., 836 Hubbard, Chicago

Tracing Sheets
Wade Instrument Co., Cleveland, Ohio

Transmissions, Variable Speed
Ideal Commutator Dresser Co., Sycamore, Ill.

Tube Flanging Machines
Grant Mfg. & Mch. Co., Bridgeport, Conn.

Tubular Rivet Setters, Automatic Feed
Chicago Rivet & Machine Co., 1855 S. 54th St., Cicero, P. O. Chicago, Ill.

Tungsten Carbide Tools
Circle Tip Tool Corp., East Orange, N. J.
Michigan Tool Co., Detroit, Mich.
Super Tool Co., Detroit, Mich.

Universal Joints
American Tool Works, Inc., Hartford, Conn.
Chicago Gear Works, 440 N. Oakley, Chicago

Used and Rebuilt Machinery
Aaron Machinery Co., 176 Lafayette St., N. Y.
Acme Equipment Co., 128 S. Clinton, Chicago
Belyea Company, Jersey City, N. J.
Bentel-Bailey Machine Tool Corp., 30 Church St., New York, N. Y.
Bernstein & Co., Geo. M., 12 S. Clinton, Chgo.
Botwinik Brothers, Inc., New Haven, Conn.
Bradley Mch. Co., Detroit, Mich.
Brandes Mch. Co., Cleveland, Ohio
Brown Machinery Co., St. Louis, Mo.
Burns Mch., F. W., Milwaukee, Wis.
Cincinnati Machy. & Supply Co., Cincinnati, O.
Daniels, C. R., Milwaukee, Wis.
DeWitt Tool Co., 173 Grand St. N. Y. C.
Dony Mch. Co., D. E., Rochester, N. Y.
Eastern Machinery Co., Cincinnati, Ohio
Emmerman, Louis E. & Co., 1761 Elston, Chicago
Easley Machinery Co., E. L., 831 W. Evergreen Ave., Chicago, Ill.

Falk Mill Supply Co., Inc., Rochester, N. Y.
Friedrich, Inc., Ed., San Antonio, Tex.
General Blower Co., 401 N. Peoria St., Chicago
Goldman & Co., Harvey, Detroit, Mich.
Harris Electric Supply Co., 627 Wash. Blvd., Chgo.
Hill, Clarke & Co., 645 W. Washington, Chgo.
Hymen & Sons, Joseph, Philadelphia, Pa.
Indianapolis Mch. & Supply Co., Indianapolis
Industrial Machinery Co., Indianapolis, Ind.
Inland Machinery Co., 41 S. Clinton, Chicago
Interstate Machinery Co., 109 S. Clinton, Chgo.
Intraco Machinery Co., Buffalo, N. Y.
Johnson & Sons Mch. Co., Wm. C., St. Louis
Jones Machine Tool Co., Cincinnati, Ohio
Klauber Machinery Co., St. Louis, Mo.
Lake Machinery Co., 656 W. Lake, Chicago.
Lang Machinery Co., Pittsburgh, Pa.
Legrand, T. V., Normandy (St. Louis Co.), Mo.
Lowe Co., Chas. E., Hartford, Conn.
Lucas & Son, J. L., Bridgeport, Conn.
McDonald Machinery Co., St. Louis, Mo.
Marr-Galbreath Mch. Co., Pittsburgh, Pa.
Meyer Mch. Co., Walter H., Fort Wayne, Ind.
Miles Machinery Co., 2025 Genesee Ave., Saginaw, Mich.

Morey Machinery Co., Inc., 410 Broome St., New York, N. Y.
Morris Machinery Company, Inc., Newark, N. J.
Morton Mch. Co., H. L., Cleveland, Ohio

Buyers' Directory

Used and Rebuilt Machinery—Cont.

- Nelson Machinery Co., Green Bay, Wis.
 Norton-Broadway Machinery Co., Cincinnati, O.
 O'Brien Machinery Co., Philadelphia, Pa.
 Osborne & Sexton Machinery Co., Columbus, O.
 Ott Mch. Sales, Inc., Detroit, Mich.
 Pasaman Bros., 705 W. Washington, Chicago
 Reeve-Fritts Co., 28 N. Clinton, Chicago
 Reliance Machinery Sales Co., Pittsburgh, Pa.
 Riverside Mch. Depot, Detroit, Mich.
 Rosenkranz & Weisbecker, 2309-A Singer Bldg.,
 New York City
 Scott Mch. Inc., 1811 Carroll Ave., Chicago.
 Segal Machinery Co., 117 S. Clinton St., Chicago
 Simmons Machine Tool Corp., Albany, N. Y.
 Standard Machinery Co., Grand Rapids, Mich.
 Strong, Carlisle & Hammond Co., Cleveland, O.
 Surplus Stock & Mch. Co., Inc., 618 W. Lake
 St., Chicago, Ill.
 Triplex Mch. Co., Pittsfield, Mass.
 United Machinery & Supply Co., St. Louis, Mo.
 Victor Mch. Co., 130 S. Clinton, Chicago
 Victor Mch. Exchange, 251 Centre St., N. Y. C.
 Vine, R. A., Detroit, Mich.
 Wachs-Gress Co., 1545 Dayton, Chicago
 West Penn Machinery Co., Pittsburgh, Pa.
 White Mch. Co. A. D., 108 N. Jefferson, Chgo.
 Wigglesworth Machinery Co., Cambridge, Mass.
 Winterhoff Mch. Co., Detroit, Mich.
 Zeve, Alex., 2280 Woolworth Bldg., N. Y. C.

Vacuum Cleaners, Industrial

- Breuer Elec. Mfg. Co., 5108 N. Ravenswood,
 Chicago

Vacuum Cleaners, Portable

- Breuer Elec. Mfg. Co., 5108 N. Ravenswood,
 Chicago

Valves

- Galland-Henning Mfg. Co., Milwaukee, Wis.
 Hanna Engineering Works, 1763 Elston, Chicago
 Ross Operating Valve Co., Detroit, Mich.

Valves, Air

- Air-Way Pump & Equip. Co., 625 Jackson, Chgo.
 Bell Machine Co., Oshkosh, Wis.
 Galland-Henning Mfg. Co., Milwaukee, Wis.
 Hanna Engineering Works, 1763 Elston, Chicago
 Legansport Machine, Inc., Legansport, Ind.
 Ross Operating Valve Co., Detroit, Mich.
 Tomkins-Johnson Co., Jackson, Mich.

Valves, Auto. Self-Open.

- Bell Machine Co., Oshkosh, Wis.

Valves, Foot, Lever & Solenoid

- Berkeley Engineering Co., Cleveland, Ohio
 Hanna Engineering Works, 1763 Elston, Chicago
 Nicholson Co., W. H., Wilkesbarre, Pa.

Valves, Hydraulic

- Berkeley Engineering Co., Cleveland, Ohio
 Galland-Henning Mfg. Co., Milwaukee, Wis.
 Hanna Engineering Works, 1763 Elston, Chicago
 Ross Operating Valve Co., Detroit, Mich.

Valves, Operating

- Berkeley Engineering Co., Cleveland, Ohio
 Galland-Henning Mfg. Co., Milwaukee, Wis.
 Hanna Engineering Works, 1763 Elston, Chicago
 Ross Operating Valve Co., Detroit, Mich.

Vises, Drilling Machine

- Armstrong-Rlum Mfg. Co., 5741 Bloomingdale
 Ave., Chicago, Ill.
 Armstrong Bros. Tool Co., 308 N. Francisco Ave.,
 Chicago, Ill.
 Chi. Tool & Eng. Co., 8400 So. Chi. Ave., Chgo.
 Desmond-Stephan Mfg. Co., Urbana, Ohio
 Heuser Mfg. Co., 1638 N. Paulina, Chicago
 Johnson Tool Co., Inc., East Providence, R. I.
 Kim-Vise, Inc., Detroit, Mich.
 L-W Chuck Co., Toledo, Ohio
 Martin Tool & Die Works, Springfield, Ohio
 National Machine Tool Co., Racine, Wis.

- Plunket Machine Co., 1823 W. Lake St., Chicago
 Sheldon Mch. Co., 1629 N. Kilbourn, Chicago

Vises, Machinists'

- Desmond-Stephan Mfg. Co., Urbana, Ohio
 L-W Chuck Co., Toledo, Ohio
 New Britain Tool & Mfg. Co., New Britain, Conn.
 Sheldon Mch. Co., 1629 N. Kilbourn, Chicago
 Western Tool & Mfg. Co., Springfield, Ohio

Vises, Milling Machine

- Chi. Tool & Eng. Co., 8400 So. Chi. Ave., Chgo.
 Desmond-Stephan Mfg. Co., Urbana, Ohio
 Hartford Special Mch. Co., Hartford, Conn.
 L-W Chuck Co., Toledo, Ohio
 Plunket Machine Co., 1823 W. Lake St., Chicago
 Sheldon Mch. Co., 1629 N. Kilbourn, Chicago

Vises, Shaper

- L-W Chuck Co., Toledo, Ohio
 Plunket Machine Co., 1823 W. Lake St., Chicago
 Sheldon Mch. Co., 1629 N. Kilbourn, Chicago

Water Cooling Devices for Spot Welders

- Eisler Eng. Co., Inc., Newark, N. J.

Welders, Arc

- Chicago Electric Co., 1330 W. Cermak Rd., Chgo.
 Hobart Brothers Co., Troy, Ohio
 Lincoln Electric Co., Cleveland, Ohio

Welders, Arc, Diesel Driven

- Lincoln Electric Co., Cleveland, Ohio

Welders, Automatic, A. C.

- Lincoln Electric Co., Cleveland, Ohio

Welders, Arc, A. C. Type

- Eisler Eng. Co., Inc., Newark, N. J.

Welders, Arc, Engine Driven

- Lincoln Electric Co., Cleveland, Ohio

Welders, Portable

- Hobart Brothers Co., Troy, Ohio
 Lincoln Electric Co., Cleveland, Ohio

Welding Accessories

- Hobart Brothers Co., Troy, Ohio
 Lincoln Electric Co., Cleveland, Ohio

Welding Electrodes and Holders

- Hobart Brothers Co., Troy, Ohio
 Lincoln Electric Co., Cleveland, Ohio

Welding Electrode Tips

- Eisler Eng. Co., Inc., Newark, N. J.

Welding Generators, Arc

- Hobart Brothers Co., Troy, Ohio
 Lincoln Electric Co., Cleveland, Ohio

Welding Machines, Electric Spot

- Eisler Engineering Co., Inc., Newark, N. J.

Welding Machines and Equipment, E. I. Arc

- Hobart Brothers Co., Troy, Ohio

Welding Protective Equipment

- Lincoln Electric Co., Cleveland, Ohio

Woodworking Machinery

- Tannewitz Works, Grand Rapids, Mich.

Wrenches, Pneumatic

- Chi. Pneu. Tool Co., 6 E. 44th, N. Y. C.

Wrenches, Socket, Plain

- Apex Mch. & Tool Co., Dayton, Ohio

Wrenches, Socket, Univ. Joint Type

- Apex Mch. & Tool Co., Dayton, Ohio

Used and Rebuilt Machinery Classified Section

Lists of Used and Rebuilt Machinery, either For Sale, Wanted, or For Exchange, set in uniform style, will be published in the Classified Section at the rate of \$5.00 for your name and address and a five line advertisement. For additional lines, 40c per line.

Write directly to those offering the machine for sale, for prices and full descriptions. If what you seek is not advertised, write Hitchcock Publishing Company, Chicago, making known your wants on either new or used machinery and the publisher will gladly pass them along to the advertisers.

FOR SALE BY

Aaron Machinery Co.,
176 Lafayette St., New York, N. Y.

Automatic screw machines, B. & S. No. 9, No. 0G.
Drill, 3 $\frac{1}{2}$ " Bickford radial, s. p. d.
Drill, 4 $\frac{1}{2}$ " Mueller radial, a. c., m. d.
Drill, 4 $\frac{1}{2}$ " American radial, triple purpose, enclosed hd.
Drills, high speed, Allen, Sipp, Le Land.
Engraving machine, Gorton and Decker, all sizes.
Filing machine, Thiel No. 3, m. d.
Grinder, Reid No. 2, surface.
Lathe, Hardinge 9 $\frac{1}{2}$ " x 35" precision, q. c., g.
Lathes, all sizes, all types.
Milling machines, Becker No. 2, 2A vertical.
Millers, B. & S. No. 0, 0V plain.
Millers, Brown & S.; Kemp Smith univ., Nos. 1 & 2.
Milling and drilling machine, Triplex combination.
Pipe machines, Oster, Williams, 2", 6", m. d.
Presses, power, No. 2 $\frac{1}{2}$, 3 V & O, No. 18, 19 Bliss.
Presses and pumps, hydraulic.
Punch, Long & Atwater multiple 45" between housings,
72" bed, 175 ton ram pressure, wgt. 17 ton, 10" gap,
like new.
Shapers, 16", 18", 24" G & E. Queen City.
Wire machines, four slide, 1/8" and 3/16" cap.

FOR SALE BY

General Blower Company
401 N. Peoria St., - Chicago, Ill.

BLOWERS—FANS—EXHAUSTERS.
For Dust Collecting—Ventilating.
Oil and gas burners, cupolas, furnaces, etc.
Roots—Connerville and centrifugal blowers.
What are your blower requirements?

FOR SALE BY

Chas. E. Lowe Co.
174 Pearl Street Hartford, Conn.

Automatic, 18" Mod. C Acme, 5 spindle, ser. 13011, m. d. (2)
Automatic, No. 82, No. 83, No. 85 Acme, m. d.
Automatic, No. 90, No. 0, No. 2 Brown & Sharpe.
Automatic, 44" Model A Cleveland, serial over 34,000.
Automatic, 24" Model F Gridleys. (2)
Automatic, 14" Mod. G Gridleys m. d. ser. over 10,000 (4)
Automatic, 14" Model G Gridleys. (2)
Automatic, 14" New Britain.
Chucker, No. 34 New Britain.
Chucker-Air Chucks, No. 454 New Britain serial 22554,
m. d.

FOR SALE BY

H. L. Morton Machinery Co.
12327 Edwin Court, - Cleveland, Ohio

Drill, 3 $\frac{1}{2}$ " Carlton radial, s. p. d., with gr. box, Price...\$325
Lathe, 21 $\frac{1}{2}$ " heavy duty LeBlond, q. c. g., complete with
chuck, centers, steady rest and driving plates.
Arranged for motor drive. Price.....\$750
Milling machine, No. 3-H LeBlond plain with counter-
shaft. Price.....\$550
Turret lathe, 24" x 36" Cincinnati Acme, s. p. d.\$800

FOR SALE BY

International Machinery Co.
3131 E. Jefferson Ave., - Detroit, Mich.

Chuck, 15x40 magnetic.
Drills, Natco multiple, all sizes.
Grinder, No. 11 Brown & Sharpe plain, m. d.
Grinder, Parsons Arter rotary, 16".
Grinder, 20" Head rotary, 8".
Lathe, 5A Potter & Johnson automatic, turret.
Mill, 24" Cincinnati duplex.
Mill, 48" Cincinnati automatic, 72" table.
Press, 50 ton Lucas forcing.
Radial gear box, 3" Cincinnati Bickford.
Let us have your inquiries.

FOR SALE BY

Segal Machinery Company
117 S. Clinton St., - Chicago, Ill.

Automatics: 5A & 6A Potter & Johnston, m. d.
Gear hobbors, No. 3 & No. 12 Barber-Colman, m. d.
Grinder, No. 33 Abrasive, mot. dr., 8" cap wheel.
Lathes, 2x12 Milwaukee, semi-q. c. g. taper attach.
12x8, 14x8, 16x8, 20x8. Mon-LeBlond—q. c. g.
Millers, No. 2 Van Norman, duplex, swivel hd.;
No. 2 Kemp Smith univ.; No. 2-H B. & S. plain, s. p. d.
No. 2 Garvin duplex; 24" Cincinnati duplex.
Nibblers, Nos. 1 B & 2 Campbell, 8" cap, 24" throat.
Presses, 8-ton Gen. Hex. power; 3034 Bliss, s. s., 12" st;
Nos. 3 & 4 Bliss-cons.
Punch presses: No. 43 Toledo horn; No. 940 Max.
Ams. str. sid.—Back Gear, 8" stroke.
Screw machines, 18" Acme universal, geared head.
No. 4 & 6 W. & S., Plain & universal, bar feed.
Shapers, 16", 20", 24", 28", G. & E. Mil. and Amer.
30" Rockford, hy-service, motor drive.
Swedger, No. 4 Langeller, power infeed.
Partial list—Send us your inquiries.

USED AND REBUILT MACHINERY

FOR SALE BY

Faylor-Strafer Machinery Co.

132 Liberty St., - - New York, N. Y.

Bolt cutter, 2" Landis double head, motor drive.
 Drill, radial, Amer. 3' aens., tapping attachment.
 Grinder, No. 14 Pratt & Whitney b. b., vert. surface.
 Grinder, No. 16 Blanchard high power, vert. surf., m. d.
 Lathe, 15"x8" Lodge & Shipley, geared head.
 Lathe, 20"x9" Cleveland, geared head.
 Lathe, 26"x14" Bridgeford, geared head, m. d., taper.
 Lathe, turret 3"x36" J. & L., bar and chucking equip.
 Lathe, turret 18" Libby, geared head, s. p. d.
 Lathe, turret No. 2A Warner & Swasey grd. hd., s. p. d.
 Miller, No. 8 Becker, duplex Lincoln type.
 Miller, plain No. 24 B. & S., table work surf. 72"x134".
 Pipe machine, 4" Williams, motor drive.
 Planer, 42"x42"x18" Liberty, 4 hds, modern, rev. m. d.
 Shear, squaring 10"x16" Loy & Nawrath, arr. m. d.
 Table, circular, 42" mounted on base with cross adjust.

FOR SALE BY

Scott Machinery Sales, Inc.

1811 Carroll Ave., Chicago, Illinois

Automatic, 3" Gridley's Model G, 4 spindle, motor drive, serial No. 10,000. (6).....Price \$1050.
 Automatic, 1 1/2" Gridley's Model G, 4 spindle, motor drive, serial No. 10,000. (2).....Price \$1250.
 Chuck, magnetic, D. & W. 12"x33" 115 volts.....\$150.
 Cut-off machines, No. 80 Brown & Sharpe (2).....Price \$275 to \$375.
 Drill, 1-2-3-4 spindle.....\$25 to 400.
 Press, No. P.G.6 Ferracuta b/g standard 4" stroke, extra Pittman for 2" str. extra bolster plate, reasonable.
 Presses, 25 ton Henry & Wright dieing, complete with roll feed. (2).....each \$750.
 Screw mchs., Cleve., auto., 8" to 70", (40). \$125 to \$2500.
 Brakes, motors, planers, presses, etc.

Write for complete list and prices.

FOR SALE BY

Lang Machinery Company

28th St. & A. V. R. R.

Pittsburg, Pa

Air compressors, Ingersoll-Rand XB-2, 600, 550, 1200 & 1500 cu. ft. 100 lb. pressure, motor drive.
 Air compressors, (2) Sullivan, 480 c. f., 100 lb. b. m. d.
 Air comp. 14"x12" Ing. Rand "EK-1", 464 c. f.
 Automatic, No. 52 National Acme 4-spindle, cap. 1" b. d.
 Automatics, 1 1/2" & 2" cone, 4 spindle, m. d.
 Automatic, model "C" National Acme, 18", m. d.
 Bolt cutter, 1" Landis, 15"-3" Acme, agl. hd., b. d.
 Boring mill, 30" Bullard, threading attach., s. p. d.
 Boring mills, 42" Bullard "New Era", m. d. (2)
 Boring mill, 42" Gisholt, 2 hds., r. p. t., m. d.
 Boring mill, 52" Bausch, geared feeds, d. c. m. d.
 Boring mill, 54" Bullard, rapid prod., s. p. d.
 Boring mill, 72" Niles, 2 heads, d. c. m. d.
 Boring mill, 10" Niles, 2 heads, belt drive.
 Boring mill, hor. 20" No. 1 Cleveland, s. p. d.
 Boring mill, hor. 24" bar Lucas, tbl. type., b. d.
 Boring mill, floor type, 3" bar Niles, m. d.
 Boring mill, hor. 44" N. B. P. high column, m. d.
 Borer, port., N. B. P. Duplex, 4" bars, m. d.
 Brakes, power, 7' 10 ga., 8' 12 ga., D. & K.
 Buffer and polisher, 7 1/2 h. p. Marache, 220/360.
 Drill, heavy duty No. 1 Baker, 24" capacity 2 1/2", s. p. d.
 Drills, radial, 24" Cincinnati-Bickford, m. d.
 Drills, radial, 3" Fosdick, s. p. d.
 Drills, upright, 14" to 32", belt drive.
 Gear cutter, 48"x12" Gould & Eberhardt, s. p. d.
 Gear hobber, No. 18-H Diamond & Eberhardt, s. p. d.
 Grinder, disc, 18" Gould, dbl. end.
 Grinder, No. 3 Brown & Sharpe unit, 13"x40".
 Grinder, surface, No. 5 Grand Rapids, hyd. feed, m. d.
 Grinder, surface, 12" Pratt & Whitney vertical, m. d.
 Hammer, 100 lb. Bradley cushion helve belt drive.
 Hammer, power, 300-lb. Bradley upright helve.
 Hammer, upright, No. 4 Beaudry.
 Hammer, No. 5-B Nazel pneumatic, m. d.
 Keyseater, No. 6 Mitts & Merrill, b. d.
 Keyseater, No. 4 Mitts & Merrill, capacity 24" b. d.
 Keyseater, No. 5 Mitts & Merrill, cap. 34", m. d.
 Keyseater, Baker, 36" stroke, 34" m. d.
 Lathe, 12"x6" Prentice, geared head, c. g., s. p. d.
 Lathe, 16"x8" Hendey, c. g., t. a., b. d.
 Lathe, 20"x24" Lodge & Shipley, c. g., b. d.
 Lathe, 21"x8" LeBlond, grd. hd., t. a., m. d.
 Lathe, 24"x10" Bradford, c. g., t. a., b. d.
 Lathe, 24"x14" Schumacher & Royce, c. g., b. d.
 Lathe, 24"x14" Lodge & Shipley, c. g., d. b. g., b. d.
 Lathe, 24"x16" Lodge & Shipley, c. g., t. a., m. d.
 Lathe, 25"x14" Schumacher & Royce, p. c. g., t. a., b. d.
 Lathe, 31"x32" New Haven, triple geared, motor drive.
 Lathe, roll, 54"x24" Standard, motor drive.
 Lathe, turret, No. 3-A Warner & Swasey, s. p. d.
 Lathe, turret 30" Steinel, grd. hd., 8" h. s., m. d.

Miller, Lincoln type, No. 4 Hendey, c. c. g.
 Miller, plain No. 14 Brown & Sharpe, grd. feeds, b. d.
 Miller, plain No. 2 Cincinnati, tbl. 46"x10", b. d.
 Miller, plain No. 24 LeBlond, tbl. 52"x11-8", b. d.
 Miller, plain No. 28 Ohio, table 52"x11-8", belt drive.
 Miller, plain, No. 3 Cincinnati, b. d.
 Miller, plain, No. 4 Kempsmith Maximill, s. p. d.
 Miller, plain No. 4 LeBlond, table 72"x16", belt drive.
 Miller, plain No. 5-B Brown & S., grd. hd., s. p. d.
 Miller, plain, No. 24 Brown & S. tbl. 60"x17", b. d.
 Miller, univ. No. 3 Cincinnati, tbl. 42"x51", b. d.
 Miller, vertical, model "B" Becker tbl. 57"x12", s. p. d.
 Pipe machines, Landis 4" to 3" belt drive, (3).
 Pipe, machine, Standard, 4"-3", b. d.
 Pipe machines, Nos. 304-H, 306-A 308-A Oster, m. d.
 Pipe machine, 8" Williams, 24" to 8" motor drive.
 Pipe machine, No. 110 Merrill, 24" to 12", motor drive.
 Planer, 30"x30"x8" Niles-Bement-Pond, m. d.
 Planers, 36"x36"x10" Cincinnati, 2 heads, belt drive.
 Planer, 42"x42"x11" Woodward & Powell, 3 hds., b. d.
 Planer, 72"x72"x16" N. B. P., 4 heads, rev. m. d.
 Planer, open side crank, 26" type A universal, m. d.
 Press, arch, No. 52 Toledo, str. 44", m. d.
 Presses, No. 5 Bliss types, bed 17"x20", str. 2", b. d.
 Press, No. 95 Bliss, dbl. crk., str. 34", m. d.
 Press, No. 93 Toledo, dbl. crk., str. 3", m. d.
 Press, No. 83 Cleveland, stroke, 24", roller feed, m. d.
 Press, toggle, No. 34-A Bliss, stand.
 Press, trimming, No. 12 Erie, bed 28", str. 54", side sh.
 Press, wheel, 100-ton Caldwell, 33"x94", b. d.
 Press, wheel 200-ton Niles, 48"x108", b. d.
 Press, wheel, 250-ton Hydro Press Co., b. d.
 Profilers, Nos. E3 and E4 Keller, motor drive.
 Riveting hammer, No. 54-B high speed, m. d.
 Saw, universal shaping, 6"x6" Peerless, m. d.
 Saw, hack, No. 7 Atkins, 8"x38", motor drive.
 Saw, hack, 9"x38" Racine, 3 speed, m. d.
 Saws, hack, 12"x12" Racine, single pulley drive.
 Shaper, 16" American, b. g., o. t.
 Shaper, 20" Gould & Eberhardt.
 Shaper, 24" Smith & Mills.
 Shaper, 24" Gould & Eberhardt.
 Shear, No. 14 Canton alligator, 28" square, m. d.
 Shear, billet, No. FV-23 Pels, 3" round cap., m. d.
 Shear, rotary, No. 10 Quickwork, 14 ga. 60" throat.
 Shear, plate, No. 5 H. & J., 90"x4"-36" throat, m. d.
 Shear, plate, No. 52 Morgan, 8"x14" 24" throat, m. d.
 Shear, squaring No. 242 Niagara, 42"x14 ga. m. d.
 Slotter, 8" Betta, table 20" dia. b. d.
 Slotter, draw stroke, Baker, cap. 34"x38", m. d.
 Straightener, No. 1 Kane & Roach cap. 3" rd. m. d.
 Welder, arc 300 amp. Lincoln, d. c. or a. c.

USED AND REBUILT MACHINERY

FOR SALE BY

Surplus Stock & Machinery Co.,
620 W. Lake St., Chicago, Ill.

Dieling machine, 25 ton Henry & Wright, roll feed.
 Drill presses, h. s., 1, to 4 spindle, hand or power fds.
 Grinder, No. 2 Brown & Sharpe, surface, motor driven.
 Lathes, 14" x 5", 14" x 6" American, grd. head, taper att.
 Lathe, 16" x 10" Monarch, grd. head, motor in base.
 Mill, No. 2 Cincinnati, grd., power feeds, vert. hd.
 Mill, No. 25 Ohio universal, power feeds, vert. head.
 Complete stock of metal working machinery.
 Send for your inquiries.

FOR SALE BY

Wigglesworth Machinery Co.
199 Bent Street Cambridge, Mass.

Automatics, 3 model G. Gridleys, serials 17,000.
 Grinder, model B, 14" Pratt & Whitney.
 Grinder, No. 33 abrasive.
 Grinder, No. 16 Blanchard, 26" chuck.
 Lathes, turret, No. 4 W. & S., 1 timken bearings, (3).
 Millers, Nos. 18, 22, 1A Brown & Sharpe, motor base.
 Miller, No. 4 Knight vertical, motor base.
 Planers, 42" x 42" x 10" Detrick & Harvey, openside (2).
 Radial, 4" American triple purpose.
 Radial, 4" Cincinnati-Bickford, enc. head.
 Thread millers, Hanson & Whitney, (2).
 Send for Complete Stock List.

FOR SALE BY

The Reeve-Fritts Company
28 N. Clinton St., Chicago

Boring machine, 3" No. D Giddings & Lewis.
 Boring machine, No. 1 Barrett, cylinder.
 Cut-off machine, 12" Peter's abrasive.
 Drill, 6 spindle Valley City, adjustable, multiple.
 Gear hobber, No. 1 Adams Farwell.
 Grinder, production, type R, belt and disc.
 Grinder, No. 1 La Salle tool & surface.
 Lathes, 13" x 6" South Bend, q. c. s.
 Press, No. 24-12 S. & S. o. b. l.
 Screw driver, No. 2 Reynolds.
 Tapper, No. 1 Garvin, 4" vertical.

FOR SALE BY

Bradley Machinery Co.
529 E. Jefferson St., Detroit, Mich.

Automatic, New Britain 1x5.
 Bar shear, Doty (new).
 Coining press, Ferracute 180 ton.
 Drill, Allen 6" B. S. o. b. l.
 Drill, 32" Barnes tapping attachment.
 Drill, 26" Rockford sliding head.
 Drill, No. 314 Baker.
 Drills, 14" Cincinnati high-speed, power feed.
 Grinder, No. 70 Heald internal.
 Grinder, No. 24 E. Van Norman radial.
 Grinder, radius, 15" Van Norman.
 Grinder, No. 6 Bryant internal.
 Hammer, drop, 3500 lb. Chambersburg board.
 Mill, No. 19 Garvin duplex.
 Planer, 20x20x8" P. & W.
 Press, P02 Ferracute.
 Screw machine, No. 1 W. & S.
 Shaper, 34" Gould & Eberhardt.
 Swedger, No. 204 Etna.
 Tappers, Garvin.
 Thread roller, W. F., late type.
 Hundreds of other items available.

FOR SALE BY

Steinman Bros. Lumber Co.
Jenera, Ohio

1-25 horse power Fairbanks Morse oil pull engine.
 Diesel type, apparently good as new, including tanks
 and all equipments, price \$275.00 f. o. b. car or truck.
 If interested write for further particulars.

FOR SALE BY

Nelson Machinery Co., Green Bay, Wis.

Roller, 200 h. p. Edgemoor water tube.
 Bolt cutter, 24" National geared head, motor drive.
 Compressor, Sullivan 14x34x16 class WG-3, angle
 type, 637 CF displ. with 100 HP Allis Chalmers SR
 motor and control.
 Drill, Reid Prentice 3' radial, direct grd. motor drive,
 3 hp. 16 spindle speeds.
 Gear unit, Falk 12 1/2 H. C., Herringbones, 600 h. p., 360
 to 1800 r. p. m.
 Generators (2), 200 KW Westinghouse 3-40-2300-514
 r. p. m. belted.

FOR SALE BY

Reliance Machinery Sales Company
1405 Brighton Place, N. S. Pittsburgh, Pa.

Air compressor, 8x8 Chicago, 139 cu. ft.
 Air compressor, 324 cu. ft. Ing.-Rand, with 60 h. p.
 motor, 3-60-220 v. a. c.
 Angle shear, H. & J., double, 84x11", on turntable.
 Borer, car wheel, for 42" wheels.
 Boring mill, 51" Hausch, 2 heads, rapid traverse.
 Bulldozer, No. 9 W. W., 24" stroke, crosshead 16x89".
 Grinder, No. 2 Brown & Sharpe surface, motor drive.
 Grinders, Heim centerless, a. c. m. d.
 Miller, No. 4 Cincinnati, plain, cone.
 Miller, No. 5 B. & S., plain, table 16" x 54", cone.
 Planer, 36" x 26" x 12" Cincinnati, 2 heads.
 Press, No. 2 Toledo, o. b. l., 4" stroke.
 Press, consolidated, a. s., 5" shaft, 64" stroke.
 Press, No. 82-C Toledo dbl. crank, 5" shaft, 44" wide.
 Press, No. 97G Toledo, dbl. crank, 3 1/2" shaft, 72" wide,
 2" stroke, 75,500 lbs.
 Shapers, 16", 20" and 24", various makes.
 What do you need? What have you for sale?

FOR SALE BY

Joseph Hyman & Sons,
Tioga and Almond Sts., Philadelphia, Pa.

WORLD'S LARGEST STOCK

POWER PRESSES

No. SG 115 Ferracute, dbl. crank, tie rod 69", crk. 54".
 No. 5C Bliss (2) double crank, tie rod, 64", crk. 5" 54".
 Bliss double crank, gap, grd. 74" crank, bed 97" x 18".
 No. 138 Bliss, double crank, flywheel, 79", crank 5".
 Nos. 94C, 93B, 92D, 91C Toledo dbl. crank presses.
 Nos. 54, 55, 57, 59B Toledo, geared straight side.
 Nos. 5C, 34B tie rod, 34C & 4 Bliss toggle presses.
 No. 910B Stoll, toggle press, 7" 9" crank, 8 1/2" draw.
 No. 40 & 39 Bliss, Nos. 14 & 13 Toledo boring.
 No. 512 Niagara, geared, straight side, 8 1/2" shaft.
 150 ton No. EWG 52 Ferracute, 75 ton EG 51 Ferracute.
 800 ton American Can Coining, 751, No. E51, Ferracute.
 200 ton No. 59 Bliss, 250 ton Waterbury F. coining.
 100 ton No. 21 Bliss, 50 ton No. 3 Bliss coining.
 Squaring shears, various sizes.
 Gang slitter, 60", Braddock, type H.
 These and hundreds of others of popular makes and
 sizes, are in stock at our warehouse here.
 Rebuilt and Guaranteed.

USED AND REBUILT MACHINERY

FOR SALE BY

Hess-Schenck Company

3951 St. Clair Ave., - Cleveland, Ohio

MULTIPLE DRILL.

Bausch 24-spindles, 2" diameter, No. 3 M. T., rect., head, 40x56" O-A, motor driven, oil gear feed, large supplementary table, practically new.

FOR SALE BY

Standard Machinery Co.,

347 Indiana Ave. Grand Rapids, Mich.

Automatic, 14" Gridley, model F.
Boring mill, 42" Bullard vertical.
Boring mill, 24" Lucas horizontal.
Drills, 26" Barnes and 26" Rockford, p. f., b. g.
Grinder, No. 24 Walker surface.
Grinder, No. 4 Badger disc, motor drive.
Lathes, Porter-Cable 14 ft. (10).
Miller, model C-1 Becker heavy vertical.
Miller, No. 2V Reed-Prentice m. d. vertical.
Saw, 6" Higley cold metal.
Shaper, 15" Hendey, f. g.

FOR SALE BY

Bleser Machinery Company

209 N. Sixteenth St., - Springfield, Ill.

Air compressor, unit, automatic.
Exhaust fans, 18" and 20" and blades.
Lathe, 22"x8", taper attachment, #250.
Lathe, 36"x18" L. & S. q. c., arranged motor drive.
Shaper, 32" American, arranged motor drive, #325.

FOR SALE BY

Rosenkranz, Weisbecker & Company, Inc.

2308 Singer Building, New York, N. Y.

Boring mills, 5" & 64" bar Detrick & Harvey, m. d.
Drill, multiple spdl., No. 30 Natco, m. d., 20" round hd.
Gear cutter, 110" Newton, motor drive.
Grinder, 26"x120" Landis, plain, cylindrical, m. d.
Grinder, Cincinnati 34", face mill, motor drive.
Keyseater, No. 20 Catlin, m. d.
Lathe, 60"x25" Gleason, motor drive.
Lathe, 42"x18" Pittsburgh, quick change gear.
Planer, 72"x72"x33" N.-H.-P. 4 heads, rev. m. d.
Rolls, angle bending, 6"x8"x8" cap., m. d.

FOR SALE BY

West Penn Machinery Company

Air compressors, 30 to 2500 cubic feet.
Air compr. portable gas 1-R 150 cu. ft.
Automatic National Acme "C" 9/16, m. d. 220/3/60.
Blower, No. 4 Roots, capacity 2110 c. f. m.
Bolt cutters, 2" & 3" Acme, b. d.
Boring mill, 66" Betts, 2 heads, belt drive.
Bulldozers, Nos. 2, 4, 6, 9, 28, & 30.
Crane, 5 ton case, 65' span, 230 v., d. c.
Crane, 10 ton Whiting, 43' span, 220 d. c.
Crusher, jaw, No. 4 Champion, b. d.
Drill, radial 4" Reed-Prentice, single pulley drive.
Drills, 4 spindle Allen, No. 2 m. t., s. p. d.
Drill, multiple 25 spindle No. 30 Natco.
Drills, upright 10" to 36".
Engine, gas, 20 horse power Bessemer.
Flanger, McCabe, 1" capacity, dies.
Flanger, No. 208 Niagara, 10 Ga. b. d.
Gear cutters, Nos. 5 & 6 H. & S., 66" & 72" m. d.
Gear cutters, 11" & 24" Gleason.
Gear tester, bevel 18" Gleason.
Grinder, centerless, No. 2 Cincinnati m. d. 220/3/60.
Grinders, centerless Heim, m. d., 220/3/60.
Grinder, drill, No. 31 Oliver, 18", m. d., 220/3/60.
Grinder, knife 16" Bridgeport, m. d.
Grinder, roll, Farrell 28"x16".
Grinders, 12, 15, 20 & 30 h. p., 220/3/60.
Grinder, tool & cutter, No. 14 Cinc., m. d.
Grinder, disc, No. 8-20 Besly, belt drive.
Grinder, disc, No. 4 Gardner, motor drive, 220/3/60.
Grinder, Gisholt tool and cutter, motor drive, 220/3/60.
Groover, No. 275-A Niagara, 6", 16 ga. motor drive.
Hammers, 60 lb., 75 lb., 100 lb., 200 lb. Upright.
Hammer, power, 100 lb. Bradley cushion helve.
Hammers, Nos. 2-B, 3-B, 4-B, 5-B, Nasel.
Hammers, steam, forging & drop.
Hoist, 1 ton Shepherd 220-V, direct current.
Keyseater, No. 2 Mitts & Merrill, belt drive.
Lathe, 20x12 S.-R. E. t. a. q. c. g., b. d.
Lathe, 26"x12 Putnam, c. g., d. b. g.
Lathe, 42"x16" Schumacher Boye, c. g., belt drive.
Lathe, wheel, 78"x84" Bement, motor drive.
Lathe, spinning 32" belt drive.
Lathe, turret, W&S No. 3A & No. 3A s. p. d.
Lathe, turret, 17x6 Le Blond double back gear 18".
Locomotive, gas, 5 ton Milwaukee, 38".
Miller, vertical No. 2 Knight, b. d.
Miller, vertical No. 6 Becker, motor drive.

1210 House Building,

Pittsburgh, Pa.

Mixers, Sprout-Waldron, batch & liquid.
Pipe machine, 2", 4", 6", 8" Landis-Oster-Williams.
Planer, 36x36x10" Cincinnati belt drive.
Press, forging, 150 ton United, steam hyd.
Press, wheel 150 ton Caldwell, 42", b. d.
Press, hydraulic 100-ton Southwark.
Presses, OHI, No. 19 Bliss & No. 4 Toledo, 3 str.
Press, No. 55 Toledo, bed 20x19.
Press, double crank No. 5 Bliss, 3" stroke, b. d.
Press, rap, No. 74 Bliss consolidated 44" stroke.
Press, screw, No. 67 Niagara, hand power.
Press, 6 spindle, Waterbury-Farrell.
Press, arch, No. 30 Bliss, roll feed, b. d.
Punch, EF Cleveland, 36" throat, 14" thru 1".
Pumps, centrifugal 6", 4", 1", motor drive.
Riveters, air, hammer, spinning.
Rolls, angle, Niagara 14x14x4".
Rolling mill, cold 9"x18" motor drive.
Saws, friction, Nos. 2, 3 & 4 Ryerson motor drive.
Saw, cold, 48" Newton motor drive.
Shapers, 16", 20", 24" & 36" Gould & Eberhardt.
Shears, alligator, 14", 2", 3", 4" & 6".
Shear, Angle 6x6x1" Long & Allstatter, m. d.
Shear, 60"x3/16" Niagara, 16" gap, b. d.
Shear, 8 x14 ga. Ohi, m. d., 110/220/1/60.
Shear, circle, Niagara, 4" cutters, 16 ga.
Shear, circle No. 3 Bliss, 40"x20 gauge.
Shear, Guill., No. 5 H. & J., 48" rd., m. d.
Shear, 10"x8" Bliss, holddown, b. d.
Shear, plate, 80"x8" Pels.
Shear, 36" & 42" Niagara, 18 ga. b. d.
Shear, rotary 24" throat capacity 8", m. d. 220/3/60.
Slitter, gang, No. 2 W-F, 18", belt drive.
Slitter, gang, 36" Voder motor drive.
Slitter, gang, 36" Braddock, belt drive.
Slotters, 6" & 24" Newton.
Straightener, AS & TP 12"x3/16", belt drive.
Straightener, 42" Aetna std. 17 roll 28" m. d. 220/3/60.
Straightener, 48" Aetna-Standard, 17 roll 34", m. d.
Straightener, No. 2 K. & R., 14" square, m. d.
Straightener, No. 5 K. & R., 34" square belt drive.
Thread rollers, W-F No. 7-14" & No. 20-8".
Thread roller, No. 261 V. & O., 4" belt drive.
Tumbling barrel, 34"x45", belt drive.
Upsetters, 1" to 6".
Welder, spot 13 k. v. a. Taylor.
Welders, arc, 200 & 300 amp. Lincoln.

USED AND REBUILT MACHINERY

FOR SALE BY

Acme Equipment Company
128 So. Clinton St., Chicago, Ill.

Grinder, Heald rotary, No. 210, 8" magnetic chuck.
 Lathe, Seneca Falls, 12" x 5', motor drive.
 Lathe, South Bend, 13" x 6", belt drive.
 Milling machine, Brown & Sharpe No. 2A universal.
 Mills, Milwaukee plain, Nos. 2A & 1B, dbl. overarm.
 Nibbler, Campbell, 3/16" cap, 24" throat, m. d.
 Press, Stiles type, 70 ton cap, 14" stroke.
 Shears, power square, 30, 36, 42, 60 and 120".

FOR SALE BY

Russell Machine Co.
438 Oliver Bldg. Pittsburg, Pa.

Boring mill, Bullard, 42" New Era type.
 Boring mill, 42" Gisholt, 2 heads, m. d.
 Boring mill, hor. N. H. P. 44" bar floor type.
 Gear hobber, No. 18H Gould & Eberhardt, s. p. d.
 Generating set, 400 k. w., a. c. steam.
 Grinder, No. 3 Brown & Sharpe universal, m. d.
 Hammer, 6000 lb. double frame NBP steam.
 Lathe, 26" x 13" Chard, hvy. duty, q. c. g., t. s.
 Lathe, turret No. 3-A W & S ser. above 125,000.
 Lathe, 26"-48" x 14" McCabe 2-in-1 l. c. g., b. d.
 Lathe, 52" x 23" Pond triple geared.
 Pipe cutting and threading machine 6" Merrill.
 Planer, Cincinnati 36" x 26" x 10' table.
 Press, No. 3 Bliss type, 2" stroke, b. d.
 Saw, hack, Racine 9" x 20", m. d.
 Shaper, 34" Gould & Eberhardt.
 Shear, alligator, United, cap. 5" square.
 Shear, plate, No. 5 H. & J., cap. 90" x 14", m. d.
 Sprue cutter, No. 7 Z. & H. m. d., cap. 14" dia.
 Upsetting machines, 24, 32, 44 and 58" Ajax iron bed.

FOR SALE BY

Wm. C. Johnson & Sons Machy. Co.
1211 Hadley St., St. Louis, Mo.

Air compressors, 15 in stock.
 Automatic, cone, 14", 4 spindle, complete.
 Boring machine, 42" Betts.
 Boring mills, 6"-8" & 8"-12" Betts.
 Boring mills, 44"
 Die plottor, Garvin, 31" stroke.
 Drill, Allen 4 spindle, No. 3 taper, 12" overhang.
 Drill, No. 3 Fox, 6 spindles.
 Drill, Moline hole hog, 5-sp. No. 4 Morse taper.
 Drill, radial, 4" Dreeses and 4" Fodick; 31" Mueller.
 Drills, 15" to 42" Barnes.
 Gear hobber, No. 3 Adams.
 Hammer, steam, 2500 to 250 lbs.
 Lathe, 8" hollow spindle, I. Johnson, 25" swing.
 Lathe, 14" x 6" Hendey belted m. d. taper attach.
 Lathe, 18" x 8" Boye & Emmes, q. c.
 Lathe, 36" x 12" Lodge & Shipley.
 Lathe, 27" x 16" L. & S. q. c. g.
 Lathe, 36" x 15" Amer. q. c. g., cone head.
 Miller, No. 4 LeBlonde universal cone drive.
 Pipe machine, 3"-4"-5"-6"-8"-12".
 Press, No. 58 Toledo, double geared, 36" x 30".
 Press, No. 79 Toledo, o. b., special, 31" stroke.
 Press, 407A Bliss double crank toggle.
 Presses, Nos. 2, 3 & 4 Marshalltown.
 Presses, 3, hydraulic pump & accumulator.
 Punch, Cleveland E. F. art jaw, 47" thr., with Lysholm
 spacing table, m. d., one-man control.
 Saw, 12" x 12" Racine and Nos. 3 & 1 Marvels.
 Shapers, 12"-16"-20"-24".
 Shapers, shears, bulldozers.
 Testing machine, 100,000 lb. Riehle.
 Large stock guaranteed electric motors. Any size.

FOR SALE BY

C. R. Daniels
1514 W. Capitol Drive, Milwaukee, Wis.

Brake, No. 146 Chicago power driven bending.
 Grinder, No. 1 LeBlond motor driven tool & cutter.
 Press, No. 358 Bliss 400 ton double toggle drawing.
 Saw, No. 4 Wells motor driven band metal cutting.
 Shear, No. 298 Kutscheid power driven squaring.

FOR SALE BY

Davis Machinery Company
1-3-5 So. St. Clair St. Toledo, Ohio

Brake, 12" x 14 ga. Chicago, power, leaf type.
 Brake, 4" x 16" Chicago, power, leaf type.
 Gear hobber, No. 12 Barber-C., dbl. over-a, rapid-trav.
 Grinder, No. 11 Brown & Sharpe, s. p. d., late type.
 Milling machine, No. 14 Brown & Sharpe, s. p. d.

FOR SALE BY

J. P. Rentschler & Company
6722 N. Maplewood Ave., Chicago, Ill.

Benders, Niagara, bench type.
 Hammers, No. 1 Grant & No. 4-A high speed riveting.
 Polisher, No. 3 Gardner, ball bear., (Dumore grinder).
 Press, 15-ton Lucas forging.
 Presses, Nos. 2 and 4 Bliss stiles type punching.
 Press, No. 21 Consolidated horn with bolted table.
 Press, No. 21 Bliss inclinable, flywheel type.
 Press, No. 136 Niagara deep throat, (depth 24").
 Shear, No. 212 Pexto power squaring, 18 ga. x 42".
 Many other BARGAINS. Send us your inquiries.

FOR SALE BY

Jones Machine Tool Company
Front & Pike Sts., Cincinnati, Ohio

DRILL

3" American, s. p. drive; 4" Bickford, s. p. drive.
 Radial, Fodick 8", semi enclosed head.

LATHES

36x14' American triple geared, cone drive.
 24"x30' Lodge & Shipley, q. c., cone drive.
 18"x8' Monarch grd. head, motor drive.
 16"x10' Lodge & Shipley q. c., cone drive.
 16"x10' Hendey tie bar head, q. c., cone drive.
 16"x10' Hendey, tie bar, cone drive.
 14"x6' Willard geared head, motor drive.

MILLERS

No. 34 Ohio 3 S cone; No. 4 Cincinnati, 4 S cone.

PRESSES

No. 6-A Toledo, open back inclinable.
 No. 6-H Toledo, open back inclinable, geared.
 No. 17 Still open back inclinable.
 No. 6A Toledo incl. back geared.

SHEARS

16"-14 gauge Robinson 8" gap, motor drive.
 48"x16 gauge Queen City, 12" gap.

No. 5 L. & A. shear, 54" x 18" gap.

MISCELLANEOUS

Boring mill, 42" King vertical.
 Hack saws, 12x15 & 6x6 Racine; 6x6 Peerless.
 Keyseater, No. 1 Davis motor drive.
 Planer, 36x12 Gray, 2 heads.
 Shaping saw, 6x6 Peerless.
 Shapers, 17" & 21" Smith & Mills.
 Shaper, 24" G. & W. ram.

**A LARGE STOCK ALWAYS ON HAND—
 LET US HAVE YOUR INQUIRIES**

USED AND REBUILT MACHINERY

FOR SALE BY

General Machinery Corporation
140 Federal St., Boston, Mass.

Drill, Leland-Gifford floor, 10,000 r. p. m.
Drill, Fairbanks 20" W. & L. feed.
Miller, Sloan & Chase bench, 8" capacity.
Planer, LeBlond No. 3 plain.
Planer, Gray 22" x 5'.
Planer, Niles-Bement-Bond 54" x 50" x 16', two heads.

FOR SALE BY

Alex Zeeve
2280 Woolworth Bldg., New York, N. Y.

Drills, radial, 2', 3' and 4'.
Hammers, power, Beaudry "Champion" 400 lb.
Iron worker, Pels, No. 18 universal, arr. motor drive.
Lathe, 16", 18", 20" x 8', 10' 12' beds, quick change.
Presses, o. b. l. Bliss No. 18, a. c. motor drive, (3).
Shapers, 24" Stockbridge heavy duty b. g. cone, auto.
down feed; also others.
Shear, circle & sitting, Niagara No. 316-B, 3/16" cap.
Shear, throatless, Marshalltown No. M-10, a. c. motor
drive, 10 gauge capacity.

Also many other good tools.
We buy used machine tools.

FOR SALE BY

C. C. Howarth Machinery Co.
1440 Franklin St., Detroit, Michigan

Drills, 1, 2, 3, 4-spdl., high speed, b. b.
Grinder, 16" Person-Arter, rotary.
Grinder, No. 20 Heald rotary, m. d.
Grinders, No. 70, No. 75 Heald internal.
Grinder, 12x24 Diamond hydrolic, m. d.
Hammer, 500 lb. Bradley upright helve, m. d.
Planer, 36" Liberty open side, m. d.
Press, 50 ton Lucas forcing.
Shaping saw, 6x6 Peerless univ., m. d.

FOR SALE BY

Wachs-Gregg & Co.
1535 Dayton St., Chicago, Ill.

GOOD USED TOOLS FOR SALE

Gear cutter, No. 4 B. & S., belt dr., with lot of cutters.
Milling machine, No. 4 Cincinnati, plain, belt drive.
Planer, 48" x 48" Helmer with 3 heads, belt drive.
Planer, 48" x 14" Cleveland open side, motor drive.
Press, punch, No. 512 Niagara s. s., 5" shaft, 5" stroke.
Press, punch, No. PG5 Ferracut.
Shaper, 24" Rockford b. g. crank, belt drive.
Turret lathe, 34" Gisholt, variable speed motor drive,
very little used.

FOR SALE BY

Marr-Galbreath Machinery Company

57 Water St., Pittsburgh, Pa.

Air compressor, 4x5" Worthington, 33 cfm., m. d.
Blower, pressure, No. 11-PB Am. 14375 cfm., m. d.
Boring mill, 42" Bullard vert., p. r. t., m. d.
Boring mill, 30" Bullard vert., threading attach., b. d.
Brake, 8" x 12 ga. Chicago, power, belted.
Brake, 16" x 14 ga. Chicago, hand.
Brake, crimp and corrugating, 18" x 16 ga. Keene.
Drill, radial 34" Bickford g. b., m. d.
Drill, Barnes, 20" all geared, m. d.
Drill radial, 6" Amer. univ. g. b., m. d.
Drill, radial, 6" R. P. plain, g. b., s. p. d.
Drill, 3" radial, Dresser lat. awing table, t. a.
Drills, gang, 3 and 4 spindle, 1 to 4 MT.
Exhauster, No. 35 Buffalo, outlet 12x14", m. d.
Fan, ventilating, 24" American, m. d., 1/60.
Fan, 24" Sirocco, 4960 cfm. 4" wp., m. d.
Forging machine, 18" Acme, all steel, sides shear.
Furnace, gas fired, Tate-Jones "GOF", 1 D. 164"x11".
Furnace, T. J., 25x32x12" ID. 17600 f.
Grinder, plain No. 10 B. & S. e. p. d., collet att.
Grinder, tool & cutter No. 3 Cincinnati.
Grinder, portable surface, No. 6-OA, motor, 3/60.
Grinder, univ. C. & R. No. 3 B. & S.
Hammer, 50 lb. Boss, No. 2, with dies belted.
Hammer, 50 lb. Bradley upright strap.
Hammer, 100 lb. Little Giant, belted.
Hammer, 200 lb. Bradley upright helve, motor drive.
Hammer, 300 lb. Beaudry "Champion", b. d.
Hammer, 400 lb. Bliss board drop (rebuilt).
Hammer, 1000 lb. Chbe, steam drop, double frame.
Keyseater, No. 3 M. & M.
Keyseater, Morton, cap. 24"x24", s. p. d.
Lathe, 7x30", Dalton, type B-4, screw cutting.
Lathe, 8" x 4" South Bend, No. 332A, motor drive.
Lathe, 20"x12" American geared head, m. d.
Lathe, 22"x12" Rahn-Larmon, pl. change gears, t. a.
Lathe, 24"x10" L. S., 8-step cone, q. c. g.
Lathe, 26"x10" Wolcott, q. c. g., d. b. f., 24" h. s.
Lathe, 36"x16" N-B-P geared head, m. d.
Lathe, 42"x32" New Haven, q. c. g., motor 270 v., d. c.
Marking machine, No. 3 Noble & Westbrook.
Miller, vertical, No. 3 Becker, table 28x10".
Milling mach. univ. No. 3 Kempamith, cone.
Milling machine, univ. No. 4 B. & S. cone.

Milling machine, pl. No. 3 Cincinnati, cone.
Nailing machine, No. 6 Morgan, 8-track, m. d.
Nut runner, No. 4 B. & S., motor 110 v.
Pinion cutter, No. 3 Sloan & Chase, capacity 1x1".
Pipe machine, 4" Oster, m. d.
Pipe machine, 4" Williams, cap. 3" to 4", m. d.
Pipe machine, 18" Wieland "Standard", m. d.
Planer, 26"x26"x8" Niles, 1 hd., belt m. d.
Planer, 30"x30"x8" Cincinnati, 1-rail, 1-s. h., m. d.
Presses, No. 18 Bliss, o. b. l., 18" & 2" stroke.
Press, No. 21 Bliss, 2" stroke, for motor drive.
Press, o. b. l. No. 9 Thomas, 18" str., 650 lb. (new).
Press, o. b. l. No. 3 Perkins, pl. str., 18".
Press, o. b. l. No. 1 Thomas, 2" stroke, m. d.
Press, o. b. l. No. 61 Bliss, 4" stroke, m. d.
Press, punch, P-2, Ferracut, m. d.
Press, sgl. crank, 594" Toledo, str. 8".
Press, wheel, 60-ton W-S, 34"x20".
Press, wheel, 200-ton, 93"x16".
Punch & shear, S. E., 12" tht. 18"x8", Rock River.
Punch & shear, S. E., 15" tht. 18"x8", No. 3 L. & A.
Riveters, No. 3-A, and 120 Grant, m. d.
Rolls, 30"x6" United, 3-rolls (for leather).
Saws, metal, 4x4" & 10"x10" Napier, m. d., (2).
Screw machine, turret No. 1 Garvin, w. f.
Screw machine, turret No. 18 Dresser, w. f.
Shaper, 24" Barker, "v-ram".
Shaper, 15" Blount, (planer drive).
Shaper, 16" Smith & Mills, gear box, motor drive.
Shaper, 21" Averbek, b. g., cone.
Shaper, 34" Milwaukee b. g., V-ram.
Shaper, 28" American b. g., gear box, m. d.
Shear, alligator, 18", 8" blade.
Slotter, 34" Rhodes, bench, rotary, table.
Tapping machine, 3" Pratt & Whitney, b. d.
Testing machine, 1000 lb. Olsen hyd., hand.
Tearing machines, 600 and 1000 lb. Economy, hand.
Tumbling barrel, No. 2 Baird, tilting.
Turret lathe, 18"x6" Springfield, Fox Monitor.
Unishear, B-36" Stanley, 1/2", motor drive.
Unishear, 6-36" Stanley, 14 ga., motor drive.
Welder, arc, 300 amp. Star, 3/60/220 v.
Welder, arc, 250 amp., a. c. Hampton (new).

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quick change for screw cutting.
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Lathes, 16" Lehman, Monarch, Bradford d. b.g., q. c. g.
Millers, 6Y Brown & Sharpe; No. 1 Kempsmith plain;
Newton horizontal production-16x55 table, No. 1
Knight vertical.
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Shaper, 34" Cincinnati, motor drive.

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Press, DG 53 Ferracute, m. d.
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Press, power, No. 34 Ferracute solid back plain,
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Nos. 60G, 6G & 2G Brown & Sharpe.
2" Cleveland, Model C.

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Band Saws, Metal

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20" to 28" Barnes and Milwaukee.
No. 2 Avey, arr. M. D., 12" over-hg.
1 & 2 spindle, Allen, M. D., B. B.
3 sp., Leland G. B. B., mtr. & p. f.
on ea. sp., 12" over-hg., No. 4 taper
4 spindle Leland-Gifford, p. f.
6 spindle Kerns B. B., M. D. tap-
ping attach, on each spindle.

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No. 12-H Gould & Eberhardt.
Nos. 3 & 12 Barber-Colman, M. D.

Grinders

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Nos. 10 & 11 B. & S. Cyl., M. D.
No. 37 Gardner, motor driven.
Disc, Nos. 4 & 6 Gardner, B. B.;
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No. 2 B. & S. surface; No. 2 Reid.
No. 210 Heald Rot. Surface, 8" chk.

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6"x8" Peerless Univ. Shap., M. D.
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14", 16", 18" Hendey.
14"x6" Lodge & Shipley.
14"x6" & 16"x6" Bradford.
14"x6" American, Grd. Hd., M. D.
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20"x9" & 28"x11" Hamilton.
20"x10" & 24"x12" Schumacher.
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Pl. No. 1 Knight; No. 14 Valley City;
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No. 14 Cincinnati.
No. 2B Brown & S., Pl., S. P. D.
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Nibblers

Nos. 1, 1B & 2 Campbell.

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42"x42"x14" Hamilton.
36"x30"x6" Columbia.

Presses

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Horn, No. 22 Consolidated.
O.B.I. Nos. 1, 24, 34 & 5A Toledo;
No. 16 Stoll, M. D.; Nos. 4 & 5
Bliss, B. G.
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- 2-18"x8" Lodge & Shipley Grd. Hd. M.D.
- 20"x8" Lodge & S. Sel. Grd. Hd. Taper. S.P.D.
- 2-20"x8" Lodge & Shipley Grd. Hd. M.D.
- 30"x20" Amer. 12 speed Grd. Hd. S.P.D.
- 36"x22" Lodge & S. Sel. Hd. S.P.D. Taper.
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- 24"x24"x6' Gray Planer.
- 30"x30"x16' Gray Planer.
- 36" Cinc. Openside Crank Planer, M.D.
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- 16, 20, 24 and 28" Gould & E. Shapers, S.P.D.
- 20" Amer. Shaper, M. Mak. Tbl. & vise. S.P.D.
- 16" Ohio Crank Shaper, Cone drive.

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- 4", 6" American Triple Purpose S.P.D.
- 4" Dreeses Plain Radial, s.p.d.
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- 18H Gould & Eberhardt Gear Hobbers.
- No. 11 B & S spur and bevel Gear Cutter.
- No. 3-26", 3-36", No. 4-36" B & S Gear Cutters.
- No. 2HS Lees Bradner Gear Grinders.

Millers

- No. 3 Cincinnati Plain, 3 S.C.D.
- No. 2 Rockford Universal, Cone drive Comp.
- No. 4 Cincinnati Hi.P. Cone 3 S.C.D.D.B.3.
- No. 4 Cinc. H.P. Cone Univ. 3 S.C.D., D.B.G.
- No. 2 Cincinnati Plain Cone.
- No. 3 Kempsmith Univ. Cone complete.

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- No. 2 B & S Surface M.D.
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- No. 50, 550, 60, 65, 70 Heald Internal.

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- 60" Gisholt Vertical Rapid Traverse. S.P.D.
- 60" Niles Car Wheel Borer.

Turret Lathes

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- No. 7 Foster Univ.
- No. 4 & 6 W & S Plain Cone Drive.
- 14"x19" Fay Automatic.

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- 1—No. 11 B. & S. Motor Drive Grinder.
- 5—No. 12 Browne & Sharpe Pl. Grinders.
- 2—No. 1 P. & W. 2-sp. deep-hole Driller, motor drive.

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- 1—Gould & E. No. 36 S T Gear Rougher.
- 1—54" N. B. P. Vert. Boring Mill, 2 heads.
- 1—Natco No. C.13-H Hyd. Multiple Drill.
- 1—No. 14 Natco Mult. Drill; 12—1 1/4" O. D. spindle.
- 3—No. 310 Baker H. D. Drills.
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- 1—3" Acme Steel Bed Upset., arr. for M. D.
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- N. B. P. 5", 6 1/2" bar horiz.
- Lucas 4" bar horizontal.
- Universal 3 1/2" bar horizontal.
- Landis No. 35, 3 1/2" bar, horiz.
- Cleveland 2 1/2" bar horizontal.
- Bullard 24" 36" N. E. vertical.
- Gisholt 42" vertical 2 heads.
- N. B. P. 72" Vert. 2 heads.
- Bullard 8" Mult-Au-Matic; 6 sp.

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- Pittsburgh 36"x38", geared hd.
- Putnam 36"x28" g. h., nearly new
- Bridgford 36"x60" boring.
- Hendey 14" to 24"x6" to 12'.
- Lodge & Shipley 16"x8" grd. hd.
- Reed Prentice 24"x18", 24"x20", 200 other lathes—all sizes.

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- Cleve. 48"x48"x16', 4 hds. o. s.
- American 36"x36"x20'; 3 heads.
- W. & P. 60"x42"x19"—4 heads.
- Niles 60"x60"x12', 2 heads.
- Niles 72"x72"x14', 2 heads.

DRILL PRESSES

- Natco Nos. 12, 13 & 22 mult. sp.
- Natco C11 drill, mechanical fds.

DRILL PRESSES—Cont.

- Natco C13H drill, hyd. feeds.
- Pratt & W. No. 12 rect. head.

AUTO. SCREW MCHES.

- B. & S. No. 00G & 2G auto.
- Cleveland 2", 2 1/2" mod. A auto.
- Gridley 3/4", 7/8", 1 1/4", 1 3/4", 2 1/4".

GRINDERS

- Heald No. 25 and No. 25A hyd.
- Pratt & Whitney No. 14 surface.
- Heald No. 20, No. 22, No. 255.
- Heald No. 55, 60, 65, 70 inter.
- Landis 6x20, 10x36 hyd. pl.
- Landis 6x18, 10x24, 12x36 pl.
- Norton 10x36, 14x72 plain.
- Landis 16x32, 16x48 crankshaft.
- Norton type B-81, 14x30—36".
- B. & S. No. 1, No. 3 univ.

MILLING MACHINES

- Brown & S. Nos. 2 & 3 univ.
- B. & S. Nos. 3B, 4B, 5B plain.
- Brown & Sharpe No. 1Y plain.
- K. & T. No. 3B, 4B Pl. Mo. Ba.
- Brown & Sharpe No. 5 Vertical.
- Hanson & Whitney Thread.
- Cincinnati 18", 24", 48" auto.

MILLING MACHINES—Cont.

- Lees-Bradner No. 8.
- Ing. 24x24x12', 36x36x12', 3 hd. adj. rail.

GEAR CUTTING EQUIPT.

- Barber C. Nos. 3, 12 g. hobs.
- Brown & S. No. 13H gr. cut.
- Gould & E. 18H, 36H Gear Hobber.

- Cleveland 6 spindle spline hob.
- Gleason 10", 15" spiral bevel.
- Gleason 24", bevel gear.
- Fellows No. 8B burnisher.
- Fellows Nos. 6, 61, 515, 7, 71, 7A.
- Lees Bradnerlapper, cap. 1 1/4"x8"

TURRET LATHES

- Gisholt No. 1-L.
- W. & S. No. 4 Univ. Cd. Hd.
- W. & S. No. 1A, No. 2A.
- Cincinnati-Acme No. 1, No. 3.

MISCELLANEOUS

- American 6' Univ. Radial Drill.
- American 5' trip. purp. Radial.
- Bliss No. 27K, coining press.
- Sellers 42" wheel lathe.
- Riehle 50,000 lbs. Testing Mch.
- Dill 24" Slotter.

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ARC WELDER—Wilson 300 amp., 15 h.p. motor; portable; UNA 300 amp., 10 h.p. motor.

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BRAKES—189, 5' Box & Pan, 14 ga.

DRILLS (RADIAL)—Mueller 2½", Fosdick 2½", Prent. 3"; Carlton 4' all gear box dr.; Hammond 4' sensitive; Amer. 2½" M.D. gear box. Mueller 4½" g.box.

DRILLS (H. S. B. B.)—H & W 2, 4, 5sp.; Allen 2 & 6-sp.; Avey, Demco, Lel-Giff. 1-sp.; Avey 2-sp.

DRILLS (MISC.)—Baker No. 217 (2) & No. 314 Hvy. Duty; Hamilton 42" S.H.; Barnes 20" & 24" 1-sp. & 20" 4-sp. & 24" 3-sp. all grd. camel back; P & W No. 12 Multi-Sp.; Natco 20-sp. Rect. head.

GEAR CUTTERS—G & E 60" & B & S 26" s. p. d. automatic spur; Fellows 24" gear shaper. Cincinnati 36" gear cutter.

GRINDERS—P & W 12" vert. surf.; Cin. No. 1½ & B & S No. 12 Univ. tool. B & S Nos. 11 & 16 plain, Heald Nos. 60 & 65 Int.; B & S No. 13 Univ. & Tool; Landis 10x30" Plain; B & S 10x48"; 3—Norton 6x32" plain, Heald No. 20 Rotary Surface (3). B & S No. 2 Univ.; Badger No. 220, auto. d. e., opposed disc (4); Walker 8" Rot. Surf.; Modern No. 6 Internal & Ohio No. 3 Univ. Tool.

KEYSEATER—Mitts & Merrill No. 5 vert.

LATHES—Monarch 16"x10" M.D.; LeBlond 18x8"; Lehmann 18"x9"; Amer. 22x8"; Davis 22"x10"; L & S 20"x10"; S-B & E 20"x10" q. c. g. Flather 22"x10"; Bradford 21"x10"; LeBlond 16"x8"; P & W 17"x10"; Gleason 45"x12"; Johnson 36"x24"; Monarch 16"x8" (2). Hendey 14"x6" & 16"x8".

MILLING MACHINES—Van Norman No. 2 duplex; Ohio No. 29 Univ.; Kemp. No. 3;

B & S No. 3; Cleve. No. 1 s. p. d. univ.; Amer. No. 1½; Cin. No. 3; B & S No. 3; Hendey No. 3; LeBlond No. 3; Mil. No. 3-B & Cinc. No. 3 s. p. d. pl.; Becker Model "B" & No. 6 vert.; Kemp. No. 33 spd. Prod.; Ingersoll slab, M.D. 33", table 30½"x16"; LeBlond No. 4 m. d. pl. Cin., No. 1½ Univ. M.D.; Cin. No. 4 pl. High Power; Cin. 12" Mfg. & 24" Auto. Cleveland No. 2 S.P.D., Pl.

PIPE MACHINES—Landis 12" A.C., m.d.;

PLANERS—Gray 30"x30"x10" 2 heads; Gray 48"x48"x10"; Gray 28"x28"x6" 1-hd.; Pond 32"x34"x10"; Hamilton 60"x36"x10".

PUNCH PRESSES—Toledo No. 3, o.b.i.; Federal Nos. 1, 2, 3 o.b.i.; Bliss No. 62 geared; Ferracute No. P-4; Toledo No. 52 arch; Fer. No. EGF 52 Coining; Willard No. 4A o.b.i.; Swaine No. 38 arch, geared; Cons. No. 3, L 5 J No. 3; Swaine No. 37 o.b.i.; Bliss No. 83 Reducing.

SAWS (HACK)—Racine 6x6" H. S.; Peerless 6x6" H. S. (4); Peerless 6x6" M. D. Univ. Shaping (2).

SHAPERS—S & M, G & E, Ohio, Mi., Q. City, Davis, Cin. 16"; Ohio & G & E 20"; S & M, Q. City, Rock, 24"; Ohio 28"; Cin. 24" s. p. gr. box; Rhodes 3½" Vertical; American 24" heavy, b.g. Amer. 15"; Springfield 15".

SCREW MACHINES—W & S No. 4 & No. 6 Hand; Nat. Acme. Nos. 515, 52, 55, & 56 4-sp.; Gridley 4-sp. ¾"; Automatic. B & S No. 00 auto; B & S No. 0 Auto.

SLOTTER—Bement-Miles 10" vert.

SQUARE SHEARS—D & K 52" 14 GA. Power; Toledo 72" 14 GA.

TAPPING MACHINES—(2) Garvin No. 2 & 2X Vertical Automatic & Garvin No. 1.

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CRANES: 5 ton Whit. 27 ft. span; 2-10 ton Champion Travel. 85' 11" span; 20 ton—45 ft. Boom Ohio Steam; Model D-20; loco. type; 20 ton—45 ft. Boom Linkbelt Steam; with 7½ K.W. Elec. Gen.

DRILL PRESSES: 21" Cinc.; No. 2 Hvy. Duty; Foote Burt 20" 6-spd; Guibert Toggle Bug; 2 H.P. Motor; Ryan Toggle Bug; 2 H.P. Mtr. **DRILLS, RADIAL:** 5 ft. Amer. Trip. purp.; 32 speeds quadruple grd. hd.; 5 ft. N. B. P. **FURNACES:** (4) Bar Heat.—Oil Fir.—2 Burners. **FURNACES, Plate Heat.**—(4) Rivet Heat. (23). **GRINDERS, Misc.** Universal—No. 4 G. & L.; Surface No. 2—B. & S.; Magnetic chuck; Floor—Dbl. end—Willey Elec.

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MILL MCH. Univ. No. 3 Ryerson-C. Pl. No. 4 Cinc. Hor. Bor. Coffman 3½" bar; M.D.

MOTORS: 2 to 30 H.P.—AC—3-80-220/440 V. **PLANERS:** Gray 52"x60"x14" Table 52"x144"; Gray 42"x60"x15" 6"; 48" betw. hous. Cincinnati 24"x74"x80"; Hermance No. 50-J-12.

PITCHERS: Horizontal; Cleveland Type T. 1" thru 1"; 5" gap; 18" reach; Beatty No. 1;

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PUNCH—Multiple Gang; No. 30-A Williams & White; Bed 32"x12" 9"; 10" shaft.

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BEAM PUNCHES: No. 10 Beatty; 24" thr. 44" height of gap; with 54 Ft. Spacing Table; M.D.; No. 10½ Beatty; 24" thr. 36" gap; with 50 Ft. Spacing Table; M.D.

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THREADERS, Bolt & Pipe: Bolt—1¼" Landis 2-head; Bolt—1" Land.; 2-hd.; Pipe—No. 2 B.&K.

ARC WELDERS: 200, 300, 400 & 500 Amps. **UPSETTERS:** 1¼ & 2½" Acme; with motor.

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 Press Brake, Cin. 11' 3/16" bed and ram.
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 Drill, P & W, 16 x 8 Geared Head, 16 speeds, T. A., M. D.
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 ➤ Press, hydraulic, 400 ton, 42" x 54 between cols.
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 Roller Die Machine, 7 spindles.
 Angle Bending Rolls, 4x4x1/2, m.d.
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 Chicago All Steel 52" 18 ga., 10' 10 ga.
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 22"x8' Lodge & Shipley, m. d.
 18"x12' Lodge & Shipley, m. d.
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 16"x8' LeBlond, q. c. g., m. d.
 13"x9' Hamilton, q. c. g., c. d.
 14"x6' Hendey, q. c. g., c. d.
 14"x6' Mulliner, q. c. g., c. d.
 9" Swing 3/4" cap. Stark bench.
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 112"x20' Gage, p. c. g.

PLANERS

48"x48"x16' Putnam 4-hd., m. d.
 42"x42"x14' W. & P., 4-head.

30' Hilles & Jones plate plain.
 12"x12"x27" Wilk. bench plain.

MILLERS

No. 1 Milwaukee, m. d.
 No. 18 Milwaukee, m. d.
 No. 2 Cincinnati, plain, m. d.
 No. 2 B. & S. universal, c. d.
 No. 3 Rockford, plain, m. d.
 No. 4 LeBlond, plain, c. d.

DRILLS

6' Bickford, radial, gear box.
 3 Spdl. Rockford, No. 2 m. t.
 2 Spindle Allen, No. 2 m. t.
 6 Sp. Barnes g. dr., No. 3 m. t.
 5 Spindle Detroit horiz.
 24" Colburn No. 5 m. t.
 20" Sibley back geared.
 Baush multiple drill press.

SHAPERS

16" G. & E. 8-speed, m. d.
 16" Kelly b. g. c. d.
 20" G. & E. 8-speed, m. d.
 20" Rockford, m. d.
 24" G. & E. 8-speed, m. d.

DIE SINKERS

Kellar E-4 automatic, m. d.
 No. 2 Pratt & Whitney.

MISCELLANEOUS

Barrett hor. bor. mill, 5" bar.
 Grinders—disc, cyl. & surface.
 G. & E. gear cutter, 24x6.
 SG-115 Ferracute press.
 2100 CFT GE cent. compres.
 10" Geo. Ohl shear, cap. 3/16".

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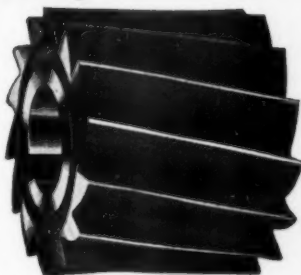
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2 1/2	2	1	4.30
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3	3 1/8	or 1 1/4	3.75
3	1 1/2	or 1 1/4	4.05
3	2	1 1/4	4.35
3	3	1 1/4	4.95
3	3 1/8	1 1/4	5.50
3	1 1/2	1 1/4	6.70
3	2	1 1/4	9.05
4	3	1 1/4	3.55
4	3 1/2	1	3.55
4	1 1/2	1	3.85
4	2	1	3.85
4	3	1	4.10
4	3 1/8	or 1 1/4	4.65
4	1 1/2	or 1 1/4	5.10
4	2	or 1 1/4	5.60
4	3	1 1/4	6.55
4	3 1/2	1 1/4	8.55
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Cone 7/8"; 1 1/4"; 1 3/4" four spindle M.D.
Gridley single spindle 3 1/4", 4 1/4",
Gridley 4-spindle Model G's 7 1/2", 7 3/4",
1 1/4" Motor Drive.
Gridley 4-spindle Model F, 3 1/4", 1 1/4",
Cleveland, 7 1/2"-7 3/4" model B; 7 1/2" model
B; 2" model A, 5-hole (4).
Acme, No. 53—1" 4-spindle.
Potter & J., No. 6-A Chucking, (4).
New Britain No. 24 chuck with t. a.
Brown & Sharpe No. 2 & No. 60.

BORING BAR

Niles, spindle diameter 4-7 1/8"

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D. & K. No. 183—8" cap. 12 ga.
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Dries & Krump 10" hand, cap. 18 ga.
Dries & Krump 6" hand, cap. 16 ga.

DRILLS

Baker No. 217 hvy. dut., S.P.D. (2)
Barnes 20" 4-spds. Morse taper No. 4,
P. F. on each spindle.
Allen, 6-Spindle B. B. overhang 7".
Avey, single spindle, B. B.
Leland & Gifford 4-Sp. H. S. B. B.,
tapping chuck on each spindle.

GRINDERS

Brown & Sharpe No. 3 universal,

Van Norman No. 3 1/2 Automatic Internal Radius B. B.
Ingersoll cutter Tub (2).
Wilmarth & Morman No. 2 Surface.
LeBlond No. 1 Tool & Cutter (2).
Ranson No. 31 Snag. M. D. 5 H. P.

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Lodge & Shipley 18"x8" Gard. Head
12-speeds, S. P. D.
Cincinnati 18"x7 1/2" g. c. taper attach.
Lodge & S. 14"x6 1/2" g. c. taper attach.
McCabe dble. spindle, 26"x48"x12".
Rahn & Carpenter 32"x14 1/2" c. 98%
Fifield 36"x12" loose-change.

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Ingersoll 24"x24"x10", two side heads
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hand, U. S. No. 1 hand M. D.

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percussion stroke 8 1/2".

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Perkins No. 3 gap.
Long & Alistat. No. 30 lac. F. W. T.
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Woodward & Powell 30x30x8".

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Niagara 5" power, cap. 10 ga.

SHAPERS

American 16", Smith & Mills 20",
Ohio 24", Smith & Mills 26".

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Warner & Swasey, No. 1, 2, 4 &
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Bardon & Oliver Nos. 2, 3 and 8.

WIRE STRAIGHTENER

Wells cap. 3/8 and 1/2".

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No. 70 Head Internal. cl. hd., m. d.
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Surface, M. D.

8" Pratt & Whitney Rotary Surface.
12"x24" Diamond Surface, M. D.

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Surface, Three M. D.
No. 2 Hem Centerless, M. D.

HEADERS

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D. S. S. D., M. D.

Several—No. 1 Waterb.-Farrel
D. S. S. D., M. D.

No. 3 Manville, D. S. S. D.
No. 22 Waterb. Farrel D. S. S. D.

LATHES

12"x6" Hendey Yoke Head.
14"x6" Hendey Yoke Head.
14"x5 1/2" American Geared Head.
14"x6" American Geared Head.
14"x6" Bradford, M. D.
16"x6" Monarch Helical Geared.
16"x8" Bradford, M. D.
16"x10" Prentice Geared Head.
18"x10" Lodge & S. Geared Head.
28"—48"x16" McCabe Dbl Spdl.
26"—48"x24" McCabe Dbl Spdl.

MILLERS

6"x14" Pratt & Whitney Thread.
6"x48" Pratt & Whitney Thread.
6"x80" Pratt & Whitney Thread.
No. 0Y Brown & Sharpe Plain.
No. 1Y Brown & Sharpe Plain.
No. 1M Cincinnati Plain, M. D.
No. 13B Brown & Sharpe Plain.
No. 33 Brown & S. Auto., M. D.
No. 2 Kemps. Vert., Maximiller.

No. 3 Cincinnati Vertical.
No. 3 Brown & Sharpe Univ.
24"x24"x10" Ingersoll Planer.

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Two—1 1/2" New Britain Automatic,
M. D.

SHAPERS

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24" Gould & Eberhardt Crank.
24" Stockbridge Crank, M. D.

TURRET LATHES

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No. 5 Foster A. G. H.
No. 5 Foster Gear'd Head.
Three—No. 21. Gisholt.
2 1/2"x24" Jones & Lamson Steel
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3"x36" Jones & L. Steel Hd., M. D.
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m. d.

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3" Binsee knee type.
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3 1/2" Niles car wheel.
4 1/2" King.
4 1/2" Detrick & Harvey.
5 1/2" Bullard.
3 1/2" Gisholt.

DRILLS

2 1/2", 2 3/4" & 2 7/8" Cincinnati.
2 1/2" Barnes all geared.
2 1/2", 2 3/4", 2 7/8" Superior.
2 1/2" Aurora.
3 1/2" Snyder.
No. 121, 217, 314, 315, 321
Baker
No. 2 Mfg. Colburn 1, 2, 3, 4
spdl
Nateco multiple, Nos. 11, 12,
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hole.
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4" Hammond radial.
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Sensitive; All makes and sizes.

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28" G. & E. spur. & bevel.
36"x10" Newark automatic.
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Gleason quenching press.
Nos. 6 & 7A Fellows
Fellows hourglass generator.
Nos. 2 & 2 1/2 Bilton auto.
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Ingle tooth rounder.
G & E cutter grinder.

Fellows cutter & gear checker.
National Cleveland cutter & gear
checker.
No. 10 B Lees Bradner gear
grinder.

GRINDERS

No. 2 Cincinnati centerless.
Nos. 72A3 Heald internal.
No. 12 Bryant internal.
No. 3 Barber Colman hob.
16"x32" Norton crank.
16"x48. Landis crank.
No. 4 Brown & Sharpe univ.
2 1/2" Gisholt.
1 1/2", 2 1/2" Cincinnati Acme.
2 1/2" Bullard vertical.

MILLERS

Nos. 3 & 4 Cincinnati.
No. 2 Hvy. & 3B B. & Sharpe.
Nos. 2A 2 Hvy. Mfg. Milw.
No. 4 Hendey.
No. 4 LeBlond.
No. 2 B. & S. universal.
No. 2 Rockford.
No. 3 Kenpsmith.
No. 4 Leblond.
No. 3 Cincinnati universal.
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Hydromatic.
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18", 24" & 48" Cincinnati, auto.
48" Ohio tilted offset.
Hanson Whitney thread miller.
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Nos. 1 & 2 Kent Owens hand.
66"x36"x8" Ingersoll adj. rail.
30" & 42" Ingersoll rotary.
48" & 54" Newton rotary.
Davis & Thompson drum.
Model C Becker vertical.
No. 3 Sundstrand Rigidmil.
28", 37" & 42" Briggs.
Taylor & Fenn spline.

PLANERS

24"x24"x2" Cincinnati crank.
24"x24"x6" Gray.
32"x32"x12" Niles.
36"x36"x10" Cincinnati.
36"x36"x16" Cleveland open-side.
42"x30"x10" Liberty open-side.
46"x36"x10" Liberty open-side.
48"x48"x12" Woodward &
Powell.
56"x56"x16" Gray.

SHAPERS

7" Rhodes.
10" McMahon.
15" Potter & Johnston.
16" Ohio.
16" Kelly.
16" Walcott.
16" Steptoe.

20" Hendey.
2 1/2" Gould & Eberhardt.
2 1/2" Potter & Johnston.
2 1/2" Walcott.
2 1/2" Cincinnati shaper planer.
2 1/2" Cincinnati.
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Landis—6"x18" to 16"x53".
Norton—6"x32" to 14"x72".
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Pratt & Whitney worm
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Gisholt tool grinder.
24" Ingersoll tub.
No. 60 Heat cylinder.
No. 20 Bath spline.

ENGINE LATHES

10"x5" Pratt & Whitney.
12"x6" Monarch.
13"x6" Willard.
14"x6" Monarch.
16"x6" Monarch.
16"x6" Cisco geared head.
16"x6" Hendey geared head.
16"x6" Pratt & Whitney grd. hd.
16"x6" Cincinnati.
16"x8" Cincinnati, grd. hd.
16"x8" Lodge & Shipley grd. hd.
16"x9" Lehmann geared head.
16"x10" Leblond.
18"x10" Morris geared head.
20"x8" Monarch.
20"x10" Reed Prentice grd. hd.
20"x12" Morris grd. hd.
21"x18" Leblond.
22"x10" Davis.
22"x10" Rahn Larmon.
24"x10" Hendey.
24"x12" Lodge & Shipley.
24"x14" American, grd. hd.
24"x16" Bore & Emmes.
25"x14" Leblond grd. hd.
26"x11" Wickes.
26"x12" Hendey.

LATHES, TURRET

Nos. 2, 2A, 3A & 6 W. & S.
Nos. 1B, 3 & 4 Foster.
18" Libby.

2100 TOOLS IN STOCK. SEND FOR LIST.

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3000 MACHINES IN OUR WAREHOUSES

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Bullard 24" New Era.
Niles 42", 2 head.
R. 36", 42" 2 hds. on rail.
Colburn 54", 2 heads.
Bullard 76" vertical.
Lucas No. 21 Horizontal.
Rockford No. 2, 2" bar.
Barrett No. 2 cyl., 5" bar.

DRILLS

P. & W. No. 1 Gun Barrel.
P. & W. Nos. 11, 12, 13 Mult.
Cin-Bick 3', 4' Radials.
N-B-P 6' Radial, Univ.; Reed-
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Allen 3, 4, & 6 sp. B.B.
Leiland Gifford 3 Sp.; All p.f.
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Blanchard No. 14.
Heald No. 20, 255 Rot. Surf.
B. & S. Nos. 1, 2, 3, Univ.
Bryant Nos. 6, 10A, 18A, S-A.
2 Sp. Hole, No. 40 Chuck.
Disc Grind.—All makes & siz.
Heald No. 70, 85 Internal.
Heald No. 70-A Intern. m.d.
Rivett No. 6, 103 Internal.
Nort., 6x32", 10x36", 10x50",
10x72", 14x36" Pl. Cyl.

LATHES

Hendey Lathes—most sizes.
American 20"x8", 2 h.
New Haven 24"x10", 24"x12",
24"x20".
LeBlond 17"x16", Q.C.G.
Pittsburgh 32"x24", q.c.g.
W.A.S. Nos. 1A, 2A, 3A Tur.
W-F No. 3 Chucking.
Fay & Scott 32", 56"x8" gap.

MILLERS

Brown & Sharpe No. 2A Univ.
Cin. No. 2 Vert. S.F.D.
Kempamith No. 3Un.; Milw.
2 1/2 B Vert. 2B, Pl.
Becker No. 6 AB V.
Van Norman No. 4, 2, 3, Dupl.
Lincoln Millers of all kinds.
P. & W. 6x14"; 6x48", 6x80"
Thread millers.
Milw. & Garvin Cam Millers.

PRESSES

Bliss No. 18, 19 & 20 O.B.I.
V. & O. No. 12, 14 D.A.C. In.
Zeb & Hah. 8 1/2 Percus.
Bliss No. 21, 100 ton K. J.
W-F 200 ton Knuckle Joint
Wat. F. No. 6 D.A. Pillar Cam.
Ferracute No. 105 D.A.
Ferr. D.G. 53 S.S. Draw.
Terkelsen D-1 150 t. M. Spring.
Stand. No. 4-R S.S. Reducing.
Ferracute No. PG-P4.

Henry & Wright 25 & 50 ton
Dieing Machines.

Bliss No. 16, 4" str., Overh.

SCREW MACHINES

Grid. 9/10" & 1 1/2" Mod. G.
Clev. 3/8", 1/2", 3/4", 1", 2",
2 1/2", 3", 4", 4 1/2" Auto.
B.A.S. Auto.—most sizes (we
are specialists).
New Brit. 1x3", 1 1/4"x7" A.
Davenport No. 2—M.D. Auto.
Cone 1 1/4" Automatic.
Hand Screw M. of all makes &
sizes; W. & S. Foster, B.A.S.
Jones & L. St. Hd. T. L.
2 1/2"x24", 3x36".

MISCELLANEOUS
Broaches, LaPointe 1-2-3-4.
Burnishing Barrels, Abbott.
Hammers—Board Drop, must be
moved.

Headers, many sizes & makes.

Lapper-Norton 15C.

Measuring Machines, P.&W.

12", 24" & 48".

Profilers—Many in Stock.

Rolling Mill, Robertson 12"x12"

for non-ferrous metal.

Shapers—from 7" to 32".

Sitter, Braddock 36" M.D.

Tapper—Threadnut No. 2

auto, nut.

Wire Formers, Nilson & Baird.

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NEW HAVEN, CONN.

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Radial, 3 ft. Fodick.
Nato Type K 20-spdl.
Rail, Foote-Burt Nos. 2 & 4, 4 spdl.
Allen BB 5-spindle.
Allen BB Type B esp. spdl.
Demco DAH BB, MD.
36" Cincinnati BG PF SL.
26" Barnes BG PF SL.
25" Bickford, G. E., American
BG PF SL.
20" & 24" Prentice BG.

GRINDERS:

Cylindrical, 12x42", 10x30" Landis.
Disc, No. 6—20 Berly.
Disc, No. 220 Badger & press.
Drill, New Yankee, D. E.
Universal No. 2 B. S.
Internal, Madison, Nos. 60 & 65
Heald.
Surface, No. 210 Heald 8".

HAMMERS:

50-lb. Little Giant MD.
40-lb. Bradley Helve.

LATHES:

32"x20" Gleason PCG.
26"x12" Putnam Pacific type, DBG,
Semi-QCG, T. A. 26" Chuck.
18"x8 1/2" Rahn & Mayer.
18"x8 1/2" Lodge & Shipley MD.
18"x11" Lodge & Davis.

LATHES—Turret:

16" Type A Gisholt, 6 1/4" hole.
21" Type H, Gisholt, 3 3/4" hole.
24" Type I Gisholt, 4 3/4" hole.
24" Type I Gisholt, 4 3/4" hole.
No. 4 Bardon & Oliver 1 1/2" cap.,
b. g. and p. f. to turret.

MILLERS:

No. 1-B Kearney & Trecker Plain.
No. 2 LeBlond, plain, M. D.
Nos. 2 & 3 Kempamith, plain.
No. 25 Becker-Brainard.
No. 3B Owen, DH, Vert. att.
No. 12 Brainard.

PRESSES:

Hydraulic, 42-ton Elmes.
OBI, No. 0, 4 1/2" Loebough-Jordan.
Str. Side, No. 7 Z & H, geared.
Str. Side D-44 Pexto OBI No. 29
Swaine.

PUNCHES & SHEARS:

Queen City DE, 1/2 in 1 1/2", M. D.
Rock River L, 1/2 in 1 1/2", 24 thr.
Cleveland C. SE, 3/4 in 1 1/2", 26" thr.
No. L-10 Badger, DE, 1/2 in 1 1/2".
No. 14 1/2" W-W.
No. 54 Beloit S. E.

SHAPERS:

20" Smith & Mills BG.
20" Cincinnati, traveling head, MD.

SHEARS:

Jig, GEM, 18 ga. cap., M.D.
Rotary Bevel, Lennox 3/4".
Square, Stark 9"; 18 ga. cap.

THREADERS, Pipe & Bolt:

Murphy, 3/4" dbl. head, bolt.
Pipe, 2" Oster M. D.

MISCELLANEOUS:

Bender, No. 15 Wallace.
Dbl. Seamers, Swain.
Compressor, H-B CCB, 14x9x8,
20 HP motor.
Groover, 30" Toledo.
Planer, 42"x42"x18" Putnam.
Saw, cold, No. 2-B Cochr.-Bly.

Brown Mch. Co., 2333 N. Ninth St., St. Louis, Mo.

Guaranteed

DRILLS

28" Cino-Bick Tap, Att., Gr. Box.
20" Barnes all-grd. self-oiling.
No. 2, 4-spindle Aveyomatics.
No. C-5 Natco, 10 spindles.
No. 13 Natco Multiple Spdlr.
1, 2 & 3 Sp. Allen H. S. B. B.
4 spindle L-G No. 2 M. T. p. f.
4 spindle Avey. B. B. 2 M. T.
6 Sp. Allen, 8" O. H., H. S. B. B.
3 1/2" Morris rad. A. C. Mtr. Dr.
3 1/2" Foadick rad. gr. box s.p.d.
5" Dresser Univ. rad., arr. m. d.
6" American Triple Purpose
Maxi-Sp. 17" Col. Tap. Att.
A. C. motor mounted on arm.
Extra right angle base.

GEAR HOBBSERS

No. 1/2 Schuchardt & Schutte.
No. 3 Barber Colman, m. d.

GRINDERS

Nos. 1 & 3 B. & S. Univ. 3 mtrs.
No. 1 Brown & S., Univ. B. D.
No. 20 Heald rotary surface.
12" Arter Rot. Surface M. D.
No. 1 Gardner B. Disc.
No. 200 Heald Rot. Surface.
No. 14 Gardner Opposed Disc.
No. 7 1/2 Gardner, 30" Disc, B. B.
No. 2 Gardner disc, 18", disc pr.
No. 2 B. & S. surf. b. d. & m. d.
No. 1 Wil. & M. B. B. Hand Surf.
No. 2 Norton cutter & resamer.
No. 1 Cincinnati tool & cutter.
5 H. P., 18" Queen City Disc,
b. b., New.
No. 2 Heim Centerless, M. D.

LATHES

30"x16" H. S. & Gamble, c. g.
24"x12" Schum. B. c. g. c. t. a.
20"x13" Cisco Grd. Hd., M. D.
20"x10" Schu., Boye & E., c. g.
20"x9" Hamilton, c. g.
18"x8" B. & E., c. g. c. t. a.
18"x8" Barnes, p. c. g.
16"-24"x10" S. B. Gap.
16"x6" South B., c. g.
16"x6" C. & J., grd. hd., Timken
Bearing, motor in base, new.
14"x8" Hendey, C. G. C.
14"x8" Hendey, cks. & collets.
14" & 3/4" Hardinge Bench.
9"x12" Sundstrand Mfg. grd. hd.

LATHES (TURRET)

No. 4 W. & S. cone head.
No. 4 W. & S. apd. G. H. M. 1 B.
No. 5 Foster All Grd. Hd. S.P.D.

54" BULLARD NEW ERA TYPE VERTICAL TURRET LATHE WITH SIDE HEAD, A. C. MOTOR DRIVE.

No. 27x30 U BUFFALO UNI-
VERSAL IRONWORKER,
A. C. MOTOR DRIVE.

No. 4 GALLMEYER & LIVING-
STON HYDRAULIC SUR-
FACE GRINDER, 12" x 24"
CAPACITY, A. C. MOTOR
DRIVE.

No. 6 GALLMEYER LIVING-
STON HYDRAULIC SUR-
FACE GRINDER, 12" x 48"
CAPACITY, A. C. MOTOR
DRIVE.

No. 3A W. & S. Univ. 3-11/16"
Hole, M. D., Air Chuck.
No. 2A W. & S. Univ. 3 3/4" Hole,
s. p. d.

MILLING MACHINES

No. 2 Ohio Heavy Univ. S.P.D.
No. 2 Kempsmith Universal.
No. 3 Kemps. Univ. B. G.
No. 3 Kemps. Plain, B. G.
No. 4 Hendey Norton Pl. S.P.D.
No. 4B Becker, vert., b. b., spdl.
Model "B" Becker, h. p., vert.
No. 2 1/2 Rockford universal.
No. 3 Rock'd Rigidmill, M. D.
No. 6 Whitney hand, motor dr.
No. 2Y, B. & S. Pl., mtr. drive.
No. 2, Van Norman Sub Head.
No. 1 B. & S. Plain, cone head.
No. 2 Chicago Duplex Bench.
No. 3 Burke Bench.
6x14 Pratt & Whitney thread.

PRESSES

No. 5 Bliss-Cona. o. b. i.
single grd., Air Cushion, b. d.
No. 4 Rockford o. b. i. Geared.
No. 4 Walsh o. b. i. Geared.
No. 1 Bliss Cam, Fly & Grd.
No. 6 Fox "Superflex".
20" Ton Stecher Screw.
No. 1 Loshbough J. o. b. i.
No. 2 Bliss-Cona. obi. B. D.
No. 2R & 3R Rockford obi new.
Model "B" Rockford obi Bench.

SCREW MACHINES

No. 0G B. & S. Auto. M. D.
No. 00G B. & S. Auto. M. D.
No. 0 B & S Hand m. d.

SHAPERS

24" Milwaukee back grd. crk.
20" Hendey B. G. Crk. S. P. D.
20" Steptoe b. g. crank.
20" G. & E. & Milw. b. g. crk.
16" G. & E. b. g. crank.
16" Steptoe b. g. crank.
16" G. & E. Gear Box, M. D.
24" Stockb. b. g. crank, M. D.

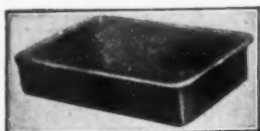
MISCELLANEOUS

Bolt Cut., 2 1/2" Landis Lead Scr.
Bor. Mill, No. 3A Univ. Hor.
Broach, No. 2 LaPointe S. P. D.
Broach, No. 3 Oilgear.
Comp. 7x6 Worth. Dup., M. D.
Die filer, No. 5 Rearwin, m. d.
Die filer, No. 5 Thiel, motor dr.
Elec. Furnace No. 659 S. C. & H.
No. 2 Grant Riv. Hammer, 1/4" cap.
Keyseater, No. 2 Davis, 1/4" cap.
Nibbler, No. 2 Campbell, M. D.
Planer, 30x30x10" Am. Box Tbl.
Punch & Shr., No. 55 H. & W.
Riv. Hammer No. 1AA Hi. Spd.
No. 2A Hi. Sp. Riv. Ham.
Riv. Ham. No. 3A & 3A H. D.,
Hi. Spd.
Riv. Htr. 1/2" Berwick Elec. 440 v.
No. 2 Klemm Metal Band, M. D.
Saw, 6x6" Peer. Univ. shpg. m. d.
Saw, 9x9" Peerless high speed.
Scleroscopes, Mod. "C" & "D"
Shore.
Shear, 6 1/2" 14 ga. D. & K. Gap.
Shear, 10 1/2" 14 ga. D. & K. Pwr.
Square, Motor Drive.
No. 138 Marshalltown Rotary
Serpentine Shear.
Var. Speed A. C. Motor Dr.
Slotter, 3 1/2" Garvin Die.
Slotter, 10 1/2" Sellers.
Slotter, 3 1/2" Rhodes Vertical.
Slotter, 12" Newton vert. B. D.
Tapper, No. 1 Garvin, m. d.
Welder, 10 kva Amer. Elec. Fus.
Welder, 12 1/2" K. W. Fed. Spot
Welder, No. 20A Thomp. Butt.

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Cleveland, model A, 14", 2" and 41".

Cleveland, Model C—1½" Motor Drive.

8-spindle Davenport, 9/16".

DRILLS, Radial—5", Bickford; 4" Mueller; 5" & 6" Western, Motor Drive; High Speed; B. B., 1 to 6-spindle.

GRINDERS; B. & S. No. 10, 11 & 14 Plain, S. C.

Head Nos. 55, 60, 65, 70, and 75.

No. 2 B & S No. 2 Diamond Surface.

10x30" Webster-Perks Universal.

Norton Plain, 6"x32", 10"x24, 36", 50" & 72".

Norton Crankshaft, 18"x52".

Landis Crankshaft, 16x48" S. C.

Landis 10"x36" Hyd. Type B, 30" wheel.

LATHES, American 16"x6", GH, QC, TA, MD.

Chard 18"x9" Tapping Attachment.

Springfield Ideal 18"x8" T. A., M. D.

Niles, B. & P., 36"x10", Triple Geared, M. D.

MILLS, No. 1-B Milwaukee Plain,

No. 2 Van Norman Duplex, M. D.

No. 3 Brown & Sharpe Plain.

Ingersoll 36"x8" Open Side, Adj. Rail, M. D.

Hall Planetary Thread Mill, M. D.

Presses, No. 56 Toledo Trimming, Side Shear.

No. 3-A Bliss & 41 & 44 Toledo Horning.

No. 34-P Toledo & P-3 Ferracute Solid Bk.

No. 29 Bliss Arch, bed 21x23½".

SHAPERS, 24" G & E, Motor & Reeves Drive.

16" Queen City and 24" Cincinnati, Cone.

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D-31 FOX MULTIPLE DRILL, RECT. HEAD, 16"x31½" spindle centers. Bored for 36 spindles. Has ten 1¼ No. 2 Taper spindles. Power feed to head.

AUTOMATICS, Several Model A Clevelands, from ½" to 3¼" bar capacity.

BOLT CUTTER, 1¼" Acme single, class A; 2" Landis.

DRILLS, 36" Cincinnati back geared, sliding head, tapping attachment.

No. 12 Minster H. D.; 24" Barnes All Geared Self Oiling belt drive.

GRINDERS, 14"x72" Norton Plain; 12"x72" Landis M. D.; No. 78 W. & M. Surf. M; D.

LATHES, 38"x14" Fifield—Cheap; 16"x8" Sidney, double back geared, quick change;

14x6 Carroll Jamison; 18"x8" Lodge & Shipley, Geared Head.

MILLERS, No. 2B Brown & Sharpe plain, single pulley drive; No. 6 Becker Vertical with ball bearing countershaft; 8" P & W Automatic; No. 3H LeBlond heavy duty plain.

PLANERS, 30"x30x8" Cincinnati, two heads on rail; 36"x15" Betts, 2 heads.

PRESSES, O. B. I.—No. 3 and 4 Walsh; No. 2½ Robinson.

RADIAL DRILL, 3' Prentice, gear box drive; 3' Cincinnati Bickford cone drive.

SCREW MACHINES, No. 4 Warner & Swasey univ. cone head, also plain screw machine,

3—No. 1 Brown & Sharpe wire feed; No. 4 Milholland; No. 4 Foster cone head.

1½"x9"; Acme cone head; No. 5 Foster grd. head—No. 4 Warner & Swasey grd. hd.

SHAPER, 28" Kelly B. G. Single pulley drive, 10 H. P. A. C. Motor.

Many other tools—exceptional "buys"—write for full details.

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- 1, 2 & 3 spdl. Lel. G., Hi-sp. b.b., m.d.
- 1, 2, 3 & 4 spdl. Avey, Hi-sp. b.b., m.d.
- 1, 2 & 4 spdl. Colburn, No. 2 prod.
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- 4 spdl. Leland G. & Allen, 12" overhang.
- No. 1 P. & W. 2 spdl. horiz., deep hole, m.d.
- 6 spdl. P. & W. Deep Hole, vert., indiv. m.d.
- Fox, Natco & Bausch Mult. Spdl., m.d.&m. (8).
- No. 121, 217, 310 & 314 Baker (8).
- 21" & 24" Cin. B. (16), dir. m.d. & m., m. inhd.
- 3" Am. Sens. Hi Speed Radial, mtr. on arm.
- 3½" Morris Radial, single pulley drive.
- Moline Hole Hog, various sizes (5).

Gear Equipment

- No. 16 Hi-sp. Gould & E. Gr. Hobber, spd.
- No. 18H Gould & Eberhardt Hobber.
- No. 36 S.T. G. & E. Auto., 4 spdl. Gr. Rough., m.d.

Grinders

- Nos. 1, 2 & 3 Brown & Sharpe Universal.
- No. 4 Brown & Sharpe Universal.
- 53" Besley vertical disc, m.d. & m.
- Nos. 6, 12A & 20 Bryant Int. Chuck. (12).

SPECIALS

No. 12 P & H Boring Mill, floor type, 7" dia. quill, m.d., 5¾" dia. spindle nose.
Model "ID" Cleveland Single End Punch, m.d., cap. 2 holes, 1 through 1½" 36" throat.

- No. 2B Brown & Sharpe Heavy, s.p.d.
- 48" Cincinnati Duplex.
- 48" Cincinnati Hydromatic.
- 18" Cinc. Semi-Auto., single & duplex heads.
- Hall Planetary Thread, Style D, m.d. & m.

Planers

- 24"x24"x6' Gray Double Housing, b.m.d.
- 36"x36"x14' Lib. Dble. Hsg., 3 hds., b. tb., m.d.
- 42"x42"x12' Liberty Openside, m.d. & m.
- 60"x60"x12' Niles Bement Pond, box table.

Presses

- 100 ton Oilgear Hydraulic vertical.
- 10, 25 and 50 ton Henry & Wright with double roll feeds, belt & m.d.
- No. 6½ Cleveland, O.B.L., back gd., 4" stroke.
- No. 5A Toledo, O.B.L., flywheel type.
- No. 55½ Tol., S.S., S.C., m.d. with auto. fds.
- No. 5AN Bliss, adj. bed, bk. gd., m.d. (5).
- No. 14 Toledo Horning, geared motor drive.
- No. 4A Bliss Adj. bed horning.
- No. 204A Bliss Adj. Bed Horn., bk. gd., m.d.
- No. 44 Cleveland, Adj. bed horning.
- P-2, P-3, P-4 Ferrac., solid back, g.m.d., (12).
- DG-53 Ferr., S.S., S.C., B.G. G.M.D. (2).

Pipe Threaders

- No. 3 Williams m.d. & m., 6" cap.
- No. 31B-A Oster, 6" cap.

Welders

- Thompson Horiz. Butt. 35 K.W.
- 20-27 KVA Taylor-Winfield Spot (9).
- 10 KW Federal Spot (3).
- 100 KW Thompson Projection Spot.
- 200 KW Federal Projection Spot.

Miscellaneous

- 1¼" Cone Auto., 4 spdl., m.d.
- 2 sp., ¾" cap. Land. Boltcut, ld. scr. att.
- 2 sp. 2" cap. Landis Bolt Cut, ld. screw att.
- 18" Gisholt Static Bal., vert. type, m.d. & m.
- 2 sp. Coulter Dia. Borer, motor in base.
- Oilgear Twin Ten Hydraulic Broach.
- No. 23 Williams & White Bulldozer, m.d.
- Elwell-P. Lift Trucks, 3 t. & 6 t., Hi-Lift (2).
- Wicaco Oil Groover, vertical type.
- Nos. 2 and 3 P. & W. Profilers, m.d. (3).
- Berwick Rivet Heaters, 220 & 440 volts (4).
- Yoder Rolls 5 & 6 spin., 2-2½" dia. shaft.
- No. 296 Niagara Shear, 8' 14 ga.
- No. 6 H.S. Langeller Swager.
- National Bent Shank Tappers, ½" capacity.
- 20" Sellers Slotter, b.m.d., Reeves Trans.

- Nos. 12 & 14 B. & S. Plain Cylindrical (7).
- 12" and 16"x36" Cincinnati Pl. Cyl. (2).
- No. 3 Abrasive Surf., m.d. with motor in base.
- Heald Internal Nos. 60, 70, 72, 75, (8).
- No. 11 Gid. & L. Tero., hyd., inter., m.d.&m. (4).
- No. 12 Gid. & L. Teromatic, hydr., int., md. & m. (7).

Lathes

- No. 1A W. & S. Grd. Hd., m.d. with air chuck.
- 16"x8" Hendey Geared Head, t.a.
- 16"x8" Hendey, b.m.d. & m., t.a.
- 18"x8" American Grd. Hd., m.d.
- 24" x 12" Am. Grd. Hd. 28" x 8" 6", 31" x 10" Wicks c/s., eccentric heads, all m.d.&m.
- 24" x 10" Lodge & S. Crankshaft, m.d.&m.
- 34" x 11" Wicks Crankshaft, m.d.&m. (2).
- Nos. 5A, 6A, 6C Potter & J. Auto., m.d.&m. (12).
- Potter & J. Auto. Unimatic, m.d.&m. (2).
- 18"x8" Hendey, t.a., Drawbar & collets.

Mills

- Pratt & Whitney Thread, 8x18".
- Nos. 1, 2 & 3 Craftsman Rotary Production.
- No. 1½ Kearney & Trecker Plain, m.d.&m.

AND A COMPLETE STOCK OF FINE UP-TO-DATE EQUIPMENT

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No. 4 Kempsmith Maximiller Plain Milling Machine, Power Rapid Traverse, S. P. D.

Grinder, No. 20 Heald rot. sur., 9" ch., m. d.
Grinder, 12" Arter, rotary surf., m. d.
Grinder, surf. 12x36 Diam. auto., hyd. fd., m. d.
Grinder, No. 4 Gallmeyer & Livingston, surface, hyd. feed m. d., magnetic chuck.
Lathe, eng., 16x6 Amer., grd. hd., m. d. collets.

Lathe, 14x8 Hendey, collets, pan bed, ser. 25400
Lathe, 20x12 Cicco grd. hd., m. d. tap. att.
Lathe, eng., 30"x18" Hou-Stanw-Gamble hvy. d. Mill & shap. Mach. No. 14 Coch-Bly duplex.
Milling machine, No. 2 1/2 Rockford plain.
Presses, Nos. 2, 3, 4 & 5 Bliss-Consol. o.b.i. pl.
Presses, Nos. 5, 6, & 7 o. b. i., Bliss Cons., b. g.
Shaper, Hendey 20" "V" ram, m. d.
Shaper, Kelly 16", back geared.
Shear, 10", 14 ga, 6", 14 ga, D&K pwr. md prac new
Turret lathes, 2A & 3A W. & S. universal.

Inland Machinery Company
41 So. Clinton St. Chicago, Ill.



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No. 3 LeBlond Plain Miller, S. P. D.
No. 2 B. & S. Surface Grinder, Magnetic Chuck, Water Attachment, M. D.
16" Steptoe Shaper, Cone.
4 1/2" Morris Radial, Gear Box, S. P. D.
3 1/2" American Radial, Gear Box, Swinging and Swivel Table, S. P. D.

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30"x12" Greaves-Klusman Lathe, Cone.
24"x10" Swings 27 1/2" Greaves-Klusman Hvy. Duty Lathe, 20" 4-Jaw Chk., Cone.
21"x12" LeBlond, Hvy. Duty Lathe, Cone.
16"x48" Landis Crankshaft Grinders, Self-Contained Countershafts, Motor Drive.
3 Spindle Leland-Gifford Drill, with Grd. Tapping Hds. No. 2 M. T.

IROQUOIS MACHINERY CO., 660 Ohio St., Buffalo, N. Y.

AUTOMATICS:

B. & S. No. 0 & No. 00.
B. & S. No. 00 Turret former.
Clev Mod A, 7 1/2"; Mod B, 1 1/2".
Gridleys Mod. F. 1 1/4" (4).
Gridleys Mod. F. 2 1/4" (3).
Grid. Mod G, 3/8" Mod F, 1 1/4".

DRILLS:

Aurora 20" Sliding Hd. H. D.
1—3 Spindle 1/2 inch.
1—4 Spindle 1/2 inch.
Washburn 3/4" 2 a. p.

GRINDERS:

Landis No. 2 Universal.
B. & S. Univ. Tool & Cut.

Cincinnati Univ. Tool & Cut.
Norton Pl., 6"x32".
W & M. dbl. end drill grinder.
Heald Internal No. 55.

LATHES:

Hendey Yoke hd., 14"x6" Ser.
No. 20,000, tap. att., C. D.
Rockford 14"x6" Eng. Q.C.G., 3 Step C. D.
Flather Eng. S. P. D.; South B. Bench, m. d.; All equip.
LeBlond H. d., 18"x12", c. d.

MILLERS:

Cinc. No. 2 Universal, all att.
Garvin No. 2A Univ., all att.

Van Norman No. 2 Duplex.
Van Norm. bench hand miller.

PIPE THREADERS

Rogaco Portable 2" (2).

Oster 4" B. D.; Apex 6" B. D.

PLANERS:

Powell 30"x30"x8", 2 H. D.

SHAPERS:

Potter & Johnson 15" Sw. Tble.
Davis 16"; Kelly 16".

Sim. 16" tilting table, vise.

Stockbridge 20" crank, vise.

TURRET LATHES:

J. & L. 2 1/4"x24".
W & S 1 1/4" & P & W 3/4" (2).

We Specialize In Rebuilding Automatic Screw Machines, Manufacturers of the Rogaco portable pipe threading machine.

Triplex Machine Company, 117 Fourth St., Pittsfield, Mass.

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2½" bar N.B.P., knee, M.D.
4" bar Gisholt, knee, M.D.
4½" Univ. No. 44 Tri Way.
5" bar Niles Floor type.
5" Barrett No. 2 Cyl. Borer.
6" bar NBP, Floor type, M.D.

**BORING MILLS,
Vertical**

7'-10' Ext. Type.
72" Rond, AC MD.
60" & 51" Bullards (2).

**DRILLS,
Radial**

7' American Univ. Gear Box.
6' Amer. Univ. & Plain.
6' Mueller, Gear box, M.D.
6' Cinc. Bick. Gear Box Dr.
5'; 4'; 3' Cinc. Bick., G. B.
3' American, Sensitive.
2, 4 & 6 Spindle Allens.
4 Spindle No. 2B Edlund.
4 Spindle Kokomo, No. 3 M.T.

GRINDERS

8"x54" Fitchett Pl., m.d.
10"x36" Landis Plain (3).
12"x32" No. 2 Landis Univ.
12"x30" Landis Plain.
15"x15"x10" Norton Planer
Type Surface.
6"x32" Norton Plain.
10"x50" Norton Self Cont.
14"x72" Norton Self Cont.
16"x50" Norton Self Cont.
No. 6 Bryant Chucking
18" Badger No. 26 Disc.
24" Gardner No. 4 Disc M.D.
No. 16 Blanchard, Floor, M.D.
No. 11 Landis Tool & Cutter.
No. 55, 60 and 65 Head Cyl.
No. 70 Head Internal.
14" P & W Surface M. D.
No. 2 B. & S. Surface M. D.
No. 13 B. & S. universal.

LATHES

14"x6" Cisco t.a., draw-in.
14"x6" Monarch, q.c.g., cone.
16"x8" Greaves K., Q.C.G.

**LATHES
(Continued)**

16"x8" Hende Cone. T.A.
16"x8" Prentice, Grd. Hd.
16/18"x8" Am., Q.C.G., Cone.
18"x8" Advance, Q.C.G.
20"x8" Lodge & S. Cone.
19"x8" LeBlond, Cone.
20"x10" Greaves Klusman.
22/24"x8" Lodge & S. cone.
24"x12" Putnam Q.C.G., cone.
24"x19" American L. C. G.
28"x12" Boye & Emmes.
28"x17" Chard, Grd. Hd.
30"x18" Bridgeford turning.
32"x14" Boye & Emmes, Cone.
32"x16" Davis, M.D.
32"x17" Fifield, triple grd.
32"x22" Schumacher Boye.
36"x22" Pond Grd. Hd. m.d.
42"x18" Pittsburgh QCG Cone.
42"x20" L. & S. Cone, Q.C.G.
48"x40" Fifield, Cone.
60"x25" Gleason hvy. duty.

MILLERS

1B & 1½ B.B. & S. G.H.S.P.D.
No. 2 Cincinnati Pl., Cone.
No. 3 Cincl., Rect. Overarm,
Motor in Base.
No. 4 Cin. H. Power Pl. P.R.T.
No. 4G LeBlond S.P.D.
No. 2M Cin. Vert., Mtr. in B.
Nos. 5, 5C, 6 & B Beck. Vert.
Model CS Becker Continuous.
No. 2 Cin. Univ. Grd. H. M.D.
No. 2 B & S Univ., Cone.
No. 3 LeBlond Univ., Cone.
4" P & W Spindle (3).

PLANERS

84"x84"x18" N.B.P., M.D. (4)
48"x60"x12" Gray, 2 Hds.
48"x36"x10" Gray, 2 Hds.
36"x36"x8" D. & H. Openside
30"x30"x9" Powell, 2 Hds.
24"x30"x6" Cincl., 2 Hds.
36" Newton Rotary, M.D.
30"x30"x10" D. & H. Openside.
24"x8" Gray; 24"x7" Niles.
24" Lynd Farquhar Openside.

TURRET LATHES

1½" & 2" P. & W's. (2).
3½"x36" Cincl. Acme, Grd. Hd.
No. 4 W. & S. cone, screw.

**TURRET LATHES
(Continued)**

No. 5 Foster, 1-13/16" bar.
24" Glah., 61" H.S., A.C., M.D.
24" Steidle, 61" H.S., M.D.
2½"x24" & 3"x36" J. & L.

MISCELLANEOUS

Automatic, 21" Gridley, 1 Sp.
Billet Breaking Mach., Ajax.
Bolt Threader, 1½" Landis.
Broach, No. 3B LaPte. M/D.
Chucking, Nos. 34 & 23 N. B.
Flanger, 1" McCabe Pneu.
Gear Cutter, 110" Newton Spur
Gear Planer, 24" Gleason.
Gear Hob, No. 12 Barber Cole.
Gear Hobber, 6" Pfauter.
Gear Shaper, No. 61 Fellows.
Gear Generator, 11" Gleason.
Header, 2" Acme, Steel.
Keystra, No. 1 Bak., No. 1 Dav.
Keysta., Nos. 2, 3 & 4 M&M
Pipe Machine, 5" Williams.
Pipe Machine, 12" Saunders.
Pipe Mach., 2" Bignall Keeler.
Press, 400 ton N.B.P. H. Hy.
Press, No. 8½ Z & H Percussion
Press, No. 61 Spec. V & O.
Press, No. 74 Bliss Consolidat.
Punch & Shear No. 47 PBC B.
Punch 54" H & J No. 2 D.E.
Punch, 36" Whit. 1"x1".
Rolls, 10"x1" Niles.
Rolls, 14"x1" Wickes
Rolls, 20"x½" H & J No. 6
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Rolls, 6"x6"x1" Angle.
Rolls 10"x1" Rock River, Belt.
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Saw, 9"x9" Peer. Hack, M/D.
Saw, No. 17 Higley 8" Cold.
Saw, No. 2 Cochran Bly 6" C.
Saw, 6" Avey Millband.
Saw, 6" Gorton No. 2B Inter.
Saw, 12"x15" Racine M/D.
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126"x1" Amer., 22" Gap.
126"x1" Niagara, 18" gap.
Shapers, 24", 20" & 16" Cincl.
Shaper, 16" American, Cone.
Shaper, 24" Gould & Eberhardt
Shaper, 16" Ohio, M/D.
Shaving Mach. P. & W. Vert.
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 No. 3½ Universal, 3½" bar.
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 7" Niles, Bement, Pond.
 10" Niles.

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 No. 12 Colburn, 1 Spindle.
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 No. D-4 Colburn Heavy Duty.
 No. 14 Natic Multiple.
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 3" Western Plain Radial.
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10"x15" gapx24'	14"x36"	18"x96"
10"x36"	14"x50"	18"-24" gapx96"
10"x50"	14"x72"	20"x96"
23"x120"	20"x144"	

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 No. 3 Cincinnati, Plain.
 No. 3-B, No. 4-B Hvy., Brown & Sharpe, Pl.
 No. 4, No. 5 Cincinnati H.P. plain.
 No. 4 Kempsmith Maximillier.
 No. 2 Brown & Sharpe Universal.
 No. 2-B, No. 3-B Milwaukee Universal.
 No. 3 Cincinnati Universal.
 No. 3-B Milwaukee Vertical.
 No. 3 Cincinnati H.P. Vertical.
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 No. 1½ V&O., O.B.I., M.D.
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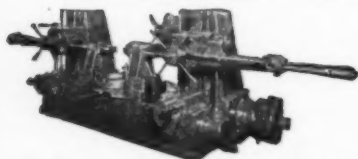
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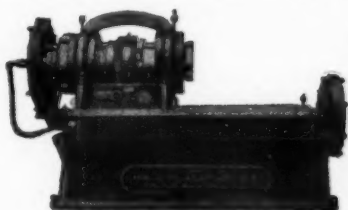
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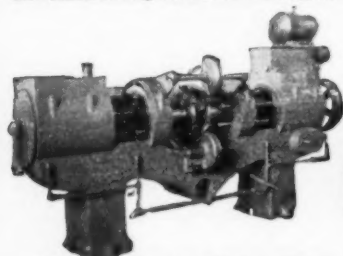
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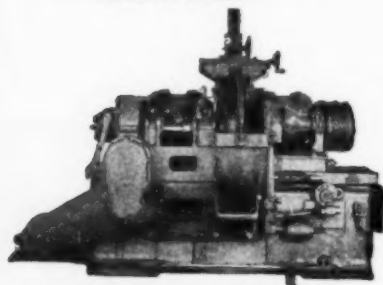
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Dalra
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Danly
Davis
Delta
Desmo
De Wi
Dony
Dreis
Drive
Durab
Daro

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Advertisers Index

Aaron Machinery Co.	146	Economy Machine Products Co.	109
Acme Equipment Company	150	Eisler Engineering Co., Inc.	114
Acme Industrial Co.	99	Eisman, & Co., Louis E.	176
American Tool Works	108	Erickson Steel Co.	74
Anderson Bros. Mfg. Co.	106	Errington Mechanical Laboratory	117
Apex Machine & Tool Co.	13	Esco Eng. & Sales Co.	22
Armgo Company	87	Essex Brass Corp.	103
Armstrong-Blum Mfg. Co.	Inside Front Cover	Essley Machinery Co., E. L.	175
Armstrong Bros. Tool Co.	26	Etico Tool Co.	56
Auto Moulding & Mfg. Co.	85	Excelsior Tool & Mch. Co.	126
Ayer Mfg. Co., Co., F. H.	96		
		Failor-Strafer Machinery Co.	147
Baldor Electric Co.	67	Falk Machinery Co., Inc.	172
Banashach Machinery Corp.	152	Famco Machine Co.	48
Barr Machinery Co.	172	Federal Press Co.	87
Bates Marking Devices, H. O.	125	Federal Products Corp.	79
Bath & Co., Cyril	180	Ford Mfg. Co., M. A.	123
Baumbach Mfg. Co., E. A.	118	Friedrich, Inc., Ed.	152
Beatty Mch. & Mfg. Co.	10		
Bell Machine Co.	121	Galland-Henning Mfg. Co.	51
Belyea Company	152	Gallmeyer & Livingston Co.	102
Bennett-Rafkin Machine Tool Corp.	171	Gaston Power Tools Co.	125
Bergram Mech. Eng. Co.	20	General Blower Co.	146
Berkeley Engineering Co.	16	General Mch. Corp.	151
Bernstein & Co., Geo. M.	167	George, James W.	175
Beverly Shear Co.	105	Gits Brothers Mfg. Co.	75
Blank & Buxton Machinery Co.	98	Gorton Machine Co., Geo.	100
Bleser Machinery Co.	149	Grant Mfg. & Machine Co.	71
Botwinik Brothers	166	Grobet File Corporation of Am.	124
Bradley Machinery Co.	148		
Breuer Electric Mfg. Co.	107	Hamilton Tool Co.	62
Brickner-Kropf Mch. Co.	88	Hanna Engineering Works	7
Brown & Sharpe Mfg. Co.	11	Hardinge Brothers, Inc.	5
Brown Machinery Co.	166	Harris Electric Supply Co.	154
Buffalo Forge Co.	2	Hartford Special Machinery Co.	119
Burke Machine Tool Co.	106	Harvey Goldman & Co.	169
Burns Machinery Co., F. W.	164	Haskins Co., R. G.	17-52
Burr & Son, J. T.	87	Hassall, Inc., John	131
Busch Co., J. C.	131	Heim Co., The	82
		Heimann Mfg. Co.	124
Candey-Otto Mfg. Co.	6	Hercules Products	127
Carboloy Co., Inc.	93	Hess-Schenck Co.	149
Carlson Mfg. Co., C. H.	118	Hill-Clarke Machinery Co.	173
Carroll & Son, Wm.	109	Hobart Brothers Co.	1
Cerro de Pasco Copper Corp.	125	Howarth Mch. Co., C. C.	151
Chicago Die Casting Mfg. Co.	115	Hyman & Sons, Joseph	148
Chicago Gear Works	113		
Chicago Pneumatic Tool Co.	47	Ideal Commutator Dresser Co.	127
Chicago Rivet & Mch. Co.	19	Illinois Testing Laboratories, Inc.	134
Chicago Wheel & Mfg. Co.	90, 91	Indianapolis Machinery & Supply Co.	174
Cincinnati Machinery & Supply Co.	155	Industrial Machinery Co.	152
Circle Tip Tool Corporation	73	Industrial Plants Corp. (of Ohio)	158
Clements Manufacturing Co.	78	Inland Machinery Company	170
Continental Machines, Inc.	45	International Mch. Co.	146
Conway Clutch Co.	39	Interstate Machinery Co.	160-161
Cullman Wheel Co.	Back Cover	Iroquois Machinery Co.	170
Dalras Tools Company	Front Cover	Johnson & Sons Machinery Co., Wm. C.	150
Daniels, C. R.	150	Johnson Tool Co., Inc.	116
Danly Machine Specialties	94	Jones Machine Tool Co.	150
Davis Mch. Co.	150		
Delta Equipment Co.	175	Kamis Engineering Co.	162
Desmond-Stephan Mfg. Co.	115	Klauber Machinery Co., E. L.	152
De Witt Tool Co.	170	Knu-Vise, Inc.	128
Dony Machinery Co., D. E.	152		
Dreis & Krump Mfg. Co.	3	L-W Chuck Co.	89
Drive-All Mfg. Co.	68	Lake Machinery Co.	162
Durable Punch & Die Co.	120	Lang Machinery Co.	147
Duro Metal Products Co.	21	Lee & Son Co., K. O.	126
		Lewthwaite Mch. Co., T. H.	82
Eastern Centerless Grinding Co.	134	Lima Armature Works	129
Eastern Cutter Salvage Corp.	92	Lipe, W. G.	Inside Back Cover
Eastern Machinery Co.	159		

Advertisers Index

Littell Machine Co., F. J.	85	Schauer Machine Co.	72
Logansport Machine, Inc.	179	Scherr Co., George	121
Logeman, T. V.	154	Schmidt, Geo. T., Inc.	95
Loshbough-Jordan Tool & Mch. Co.	146	Scott Machinery Sales	147
Lowie Co., Chas. E.	146	Scully-Jones & Co.	83
Lucas & Son, Inc., J. L.	164	Segal Machinery Co.	146
Luma Electric Equipment Co.	107	Sellers & Co., Wm.	12
		Seneca Falls Machine Co.	116
M. & S. Dresser Company	78	Severance Tool Mfg. Co.	105
McDonald Machinery Co.	157	Shaw-Box Crane & Hoist Division	64
McMahon Co., Frank	89	Sheldon Machine Co.	128
Magnilline Products	128	Simmons Machine Tool Corporation	160
Mall Tool Company	49	Skillsaw, Inc.	3
Marr-Galbreath Machinery Co.	151	South Bend Lathe Works	28
Marshalltown Mfg. Co.	23	Southern Products	127
Martin Tool & Die Co., J. E.	114	Speedway Mfg. Co.	100
Master Chrome Service, Inc.	92	Stackbin Corporation	71
Master Tool Co., Inc.	92	Standard Machinery Co.	149
Meyer Mch. Co., Walter H.	152	Standard Pressed Steel Co.	25
Michigan Tool Co.	37	Stanley Works	84
Midwest Tool & Engineering Co.	81	Star Machine & Engineering Corp.	84
Miles Machinery Co.	165	Steege Machinery Co., W. L.	71
Modern Machine Corp.	109	Steinman Bros. Lumber Co.	148
Morey Machinery Co., Inc.	156	Sterling Products Co.	130-152
Morris Machinery & Co., Inc.	153	Stow Mfg. Co.	132
Morton Mch. Co., H. L.	146	Strand & Co., N. A.	20
Motor Tool Mfg. Co.	78-101	Strong, Carlisle & Hammond Co.	154
		Sundstrand Machine Tool Co.	43
National Safety Device Co.	63	Super Tool Co.	77
Nelson Machinery Co.	148	Surplus Stock & Machinery Co., Inc.	148
New Britain Tool & Mfg. Co.	85	Sutton Tool Co.	86
New Method Steel Stamps, Inc.	112		
Nicholson & Co., W. H.	115	Tannenwits Works	82
Nielsen, Inc.	80	Threadwell Tap & Die Co.	24
Norton-Broadway Machinery Co.	154	Tomkins-Johnson Co.	4
		Torq Electric Mfg. Co.	121
O'Brien Machinery Co.	174	Trico Fuse Co.	122
Oliver Instrument Co.	107	Triplex Machine Co.	170
Osborne & Sexton Machinery Co.	172	Triplex Screw Co.	105
Ott Machinery Sales, Inc.	168	Turner Uni-Drive Company	97
Paseman Bros.	168-175	Universal Engineering Co.	62-104
Plunket Machine Co., J. E.	122	Used and Rebuilt Machinery	146-176
Postal Filing Mch. Co.	108		
Pratt & Whitney	41	Vacuum Cup Metal Pulley Co.	76
Prints Electric Co.	130	Vans Motor Service	132
Proconier Safety Chuck Co.	9	Victor Machinery Co.	153
Progressive Tool & Cutter Co.	110	Victor Machinery Exchange	163
Pyrometer Instrument Co.	110	Vimco Mfg. Co.	124
		Vincent Steel Process Co.	94
Quality Hdwe. & Mach. Corp.	94	Vine, R. A.	174
Quality Tool Works	103	Vonnegut Moulder Corporation	123
Quality Tool & Die Co.	134		
		Wachs-Gregg Co.	151
Racine Tool & Mch. Co.	24	Wade Instrument Co.	131
Reeve-Fritts Co.	148	Wade Tool Co.	111
Reich Mfg. Co., J. H.	76	Walls Sales Corporation	85
Reisinger Mfg. Co.	134	Walton Co.	93
Reliance Machinery Sales Co.	148	Wardwell Mfg. Co.	103
Rentschler & Co., J. P.	150	Western Tool & Mfg. Co.	72
Renu Tool Company	124	Westlof Tool & Die Co.	67
Rigid Tool Holder Co.	118	West Penn Machinery Co.	149
Riverside Machinery Depot	156	Whistler & Sons, Inc., S. B.	61
Robbins Engineering Co.	133	White Machinery Co., A. D.	168
Rockford Drilling Mch. Co.	46	Whitney Metal Tool Co.	15
Rockford Iron Works	117	Wigglesworth Machinery Co.	148
Rosenkrantz, Weisbecker & Co.	149	Wilson, K. R.	18
Royal Mch. Exchange	172	Winterhoff Mch. Co.	152
Ross & Co., David J.	14	Wisc. Gear & Eng. Co.	152
Russell Boring Bar Co.	72	Witek Manufacturing Co.	135
Russell Machine Co.	150	Wysenbeck & Staff, Inc.	55
Ruthman Machinery Co.	128		
Ryerson & Son, Inc., Jos. T.	30	Yobe Supply Co., Wm. S.	104
		Zeeve, Alex.	151

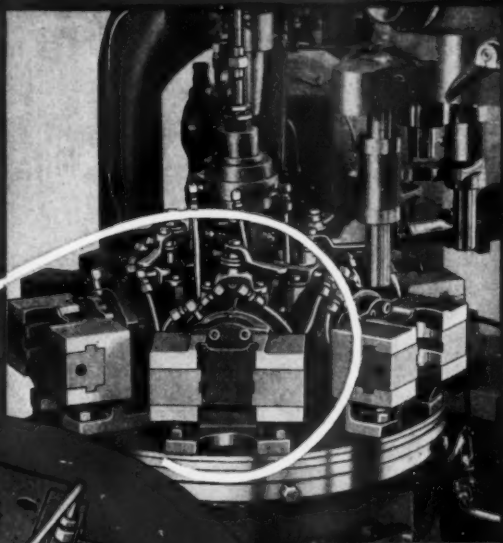
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The work table may be indexed so that the movement of the table and the desired machine operation are entirely automatic.

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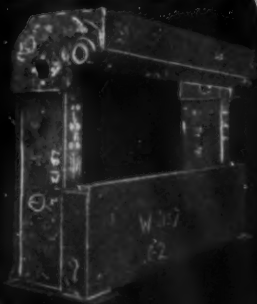
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